

Editorial



THE granting of private transmitting licences by the PMG which was commenced last month is one of the most important steps in radio ever taken in Australia.

To date, only broadcast licences, amateur licences, and licences for special purposes such as police radio have been obtainable here. But at the last Atlantic City radio conference, during which frequency allocations throughout the world were discussed and decided on an international basis, specific bands were set aside for use by citizens.

As a result, the PMG has been preparing for the granting of such licences, and for defining the conditions under which they shall operate. Obviously it is impracticable to issue licences on a wide scale to all and sundry. In the UHF region, there are many channels, but as is the case on other bands, the best use must be made of them.

The first step therefore appears to be the issue of licences to commercial firms whose efficiency and service to the public will be improved thereby. These firms for the time being will be permitted to install and operate their own equipment, but the PMG reserves the right to require its replacement by PMG owned or approved systems at any time. This proviso seems to indicate the future linking up to a radio telephone exchange of all mobile services in much the same way as your telephones are at present tied to the PMG.

At the moment it is fairly evident that such large scale use of radio facilities may not be possible for some little time—certainly not until these services are established, which, by virtue of the value to the community as a whole, must be considered as having a certain priority. There are many other problems—mostly technical—associated with the whole project, but it doesn't require a mental giant to realise the tremendous importance it will have in harnessing radio communication to our own needs.

It is this last point which makes the new scheme such an important one. There is no shadow of doubt that the facilities of radio communication are the property of the community at large, and that every person has an implied right to demand his due share of it. The necessity for preventing chaos, and for extracting the most value from techniques and possible services, means that careful control must be organised through licence allocation. It is the great development in the use of the very short wave-lengths (high frequencies) which now allows a large number of stations to be operated in a small section of the available radio spectrum. And it is fitting that the possibilities of this development should be made available to the private citizen where he can establish a claim to use it.

You radio-minded people should watch the growth of citizen radio very closely. It is destined to have a profound effect on the lives of many.

John Moyle

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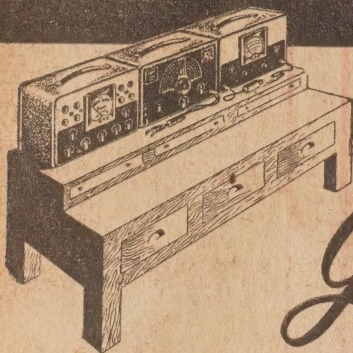
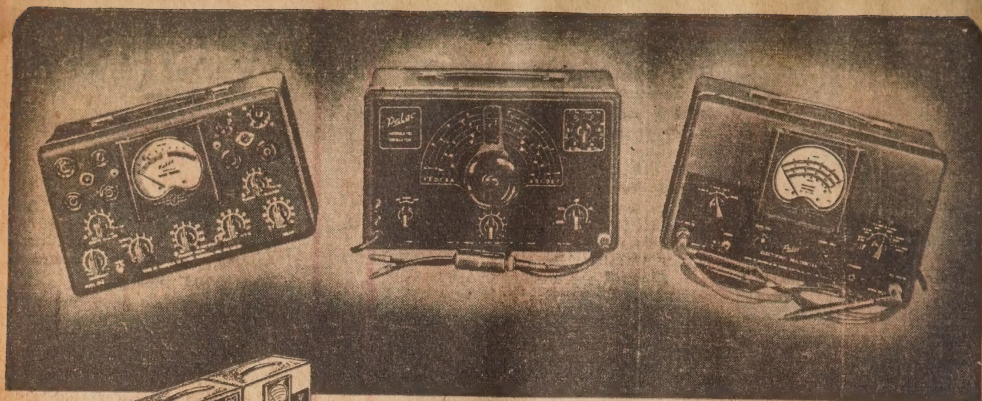
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RECREATING NATURE FROM PHOTOS



MANY of us have heard of aerial surveys. A few of the general public are aware of the possibilities and results obtainable from these processes when scientifically applied.

The most commonly known form of survey from the air is in connection with the production of maps; but what is not often understood, or frequently forgotten, is the fact that an aerial photograph of the area can also produce information relating to crops, forests, soil types, erosion, geological constructs, hydro-electric possibilities, irrigation, road and railways, human problems, as evident to the town planner.

If scientifically prepared and examined, although initially high in cost, the total results of aerial survey in its widest sense is an extremely economical method of providing, not only maps, but also providing a vast amount of information relating to the natural and husbanded resources of any nation. During the war, aerial reconnaissance produced a great amount of intelligence information at high cost in both money and in lives; but information which was cheap in the light of war. In peacetime, the opportunities are just as great and it is possible to avoid the waste which has to be incurred during the period of war.

(Please turn to page 7).



This London taxi-driver is able to save mileage and give better service because he carries two-way radio with which to receive instructions from his headquarters. His fleet of taxis saves 240,000 miles and 300 working days per year by eliminating dead mileage.

The messages were received at the London office and relayed by land-line to other interested papers in the group.

The equipment was used for the second time to describe crowd scenes outside Buckingham Palace during the Silver Wedding anniversary celebrations. It was particularly successful. Most reporters were caught in the huge crowd and could not get to a phone with their stories.

The reporter carried a portable transmitter on his back and walked through the crowd transmitting his story as he went. He beat opposition papers by an hour.

The radio-telephone has also been used for crowd scenes at the Rugby final at Wembley, and to report the street disturbances.

The main station is a 50-watt Marconi amplitude modulation trans-

Reporting with Radio

The P.M.G. is now ready to issue licences to private firms which use vehicle fleets and wish to control them through their own radio systems. Faster service, plus great saving in time and fuel will follow. It is a tremendously important step in making the ether available to the man in the street, particularly as the formation of a public radio-telephone exchange from private vehicles will probably follow. This timely article, written for us by a young journalist who is in England as the 1948-49 Kemsley Empire Scholarship winner, tells how the big Kemsley newspaper group uses radio aids to spread their newsgathering.

THE London group of Kemsley newspapers has successfully completed initial trials of its radio-telephone service for reporters. Results have been excellent, and the organisation will expand its service as soon as additional frequencies and equipment are available.

In May, the British Government granted newspapers 15 frequencies, of which the Kemsley group got one. Because of the limited range of transmitters and receivers now used, this one frequency can be used to establish stations in England and Scotland without danger of jamming.

Kemsleys were the first to use the new technique. It had been experimenting with the system for 18 months and had Marconi-made sets

ready for use immediately the Government released frequencies. It is estimated it will take other London papers three months to buy and install equipment.

Reporters first used the radio-telephone to describe crowd scenes outside Wembley Stadium during the Cup final.

By
**HERBERT G.
TURNER**

mitter-receiver operating on 78.075 megacycles. A similar transmitter-receiver of 10 watt strength is mounted in a van as the mobile station.

Reporters can transmit and receive from this van, or use it as a relay station and themselves carry a 10-watt transmitter on their backs.

The range of the mobile unit is approximately 12 miles in London, the limited range being due to building obstructions, and the low level of the ground around the city.

Strength of the equipment is to be increased as soon as possible. Walkie-talkie sets have also been ordered with a $\frac{1}{2}$ -watt output, 11in. by 4in. by 9in. in size and to be available in six months, for the use of reporters.

These sets will have a range of less than two miles, but they will be completely portable and will be used in conjunction with the higher-powered relay transmitter in the van.

At present, Kemsleys are using both narrow band and wide band transmitter-receivers as an experiment, but only one style will be installed when the more powerful equipment is available. The group will then send its present equipment to Manchester for the use of its local papers as part of a scheme to

cover most of England and Scotland with reporter radio-telephones.

Cost of each installation is approximately £450.

The most successful operators have come from the services. It has been found that reporters become excited and tend to forget the careful radio procedure that is necessary to get messages over quickly and cleanly. To gain added range, the Marconi system provides for one-way conversation so that a reporter must complete his sentence before changing to receive and getting instructions from his office.

An ordinary Army-type handset instrument is used by the reporter the transmit-receive switch being inside the handle.

At present a special staff operates the apparatus and receives all messages. Later, it will become an extension of the phoned-news room. Special radio-telephone reports will be plugged into direct lines to all parts of Great Britain.

WIRE-PHOTO NETWORKS

British newspapers now regard operation of their own wire-photo equipment as an essential. The wire-photo transmitter/receiver is as much a piece of the production furniture as the linotype or the tape machine.

Wiring of a picture from London to Glasgow arouses no more interest than a long-distance telephone call.

One reason for the growth of British wire-photo networks is the country-wide circulations of the great national papers that call for delivery of up-to-the-minute local pictures at a few publishing points. Another is the availability of wire-photo equipment at a time when newspapers have plenty of spare money and very little to spend it on.

The Kemsley group has the largest wire-photo network in Britain, and what is probably the largest privately-owned one in the world.

It has both transmitting and receiving equipment in its London, Glasgow, Aberdeen, Manchester and Newcastle offices, which serve 21 newspapers of the group.

The Sheffield office, with two papers, will get similar equipment next month.

The other six offices serving the remaining eight papers in the chain, will get receiving machines only, within six months.

The equipment at all offices is owned, operated and maintained by the organisation, which hires transmission lines from the Post Office.

When all installations are complete, any single paper in the group will be able to transmit or receive pictures to any other paper, or will be able to transmit or receive to all or a selected group of them, at the same time.

Equipment in use at Manchester and London offices are French Bellin machines which transmit and receive and can send a 10in. by 8in. print in 22 minutes. Transmission size is usually reduced to 8in. x 5in.



Even motor cycles can be fitted with simple radio sets, small enough to be carried quite easily by hand should the rider be required to leave his vehicle.

because the transmission time is reduced to 12 minutes.

The machines, which cost £7000 each, were installed in 1935.

Manchester and London offices

have installed but not yet brought into use new British-owned Muirhead transmitters and receivers which, unlike the Bellin model, have the separate functions done by separate machines. Each complete installation costs £3000.

Transmission time for a picture 11in. by 10in. is 20 minutes, but one machine can transmit while the other is receiving.

Manchester wire-photo room handles an average 40 pictures a day, rising to a maximum of nearly 60. London traffic is approximately the same. However, Manchester finds it difficult to answer all demands because with eight papers each with individual picture requirements and clashing deadlines, congestion is serious.

The wire-photo operator has a teletypewriter connected to each paper in the network and he is also in direct phone-line communication.

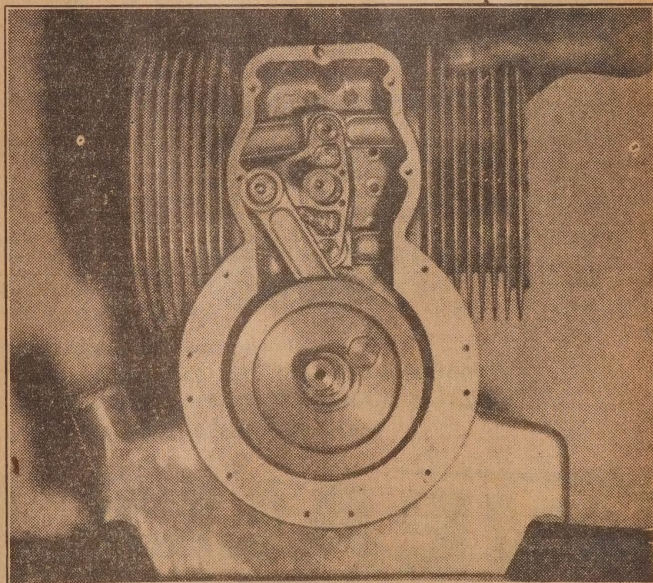
The Kemsley group is also using a new type portable Muirhead-Bellin transmitter that packs into a small suitcase and can transmit from any long-distance telephone office.

Procedure is to book a long-distance line as for a telephone call and the Post Office line is then connected to two small leads on the equipment.

Kemsleys sent successful picture from Berlin by this transmitter after the collision between a Reg fighter and a British airliner.

It was also used to send picture of the Labor Party conference at Scarborough.

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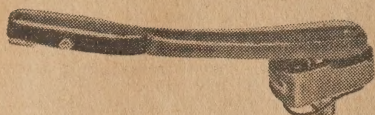
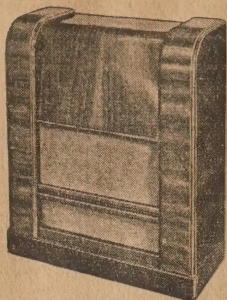
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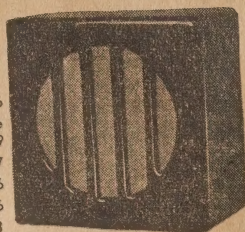
Standard 5-Valve Portable
46/9

6" Speaker Box .. 19/7

8" Speaker Box .. 23/6

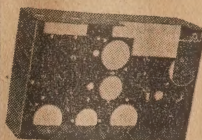
10" Speaker Box .. 28/6

12" Speaker Box .. 32/3

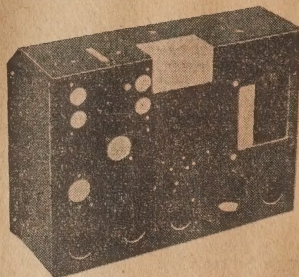


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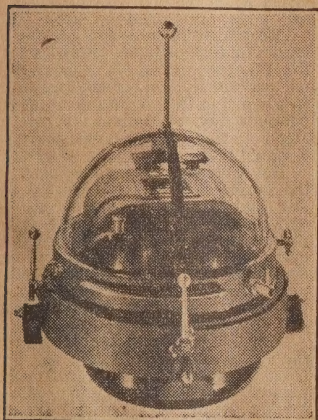
AERIAL SURVEY WENT AHEAD IN WORLD WAR 2

Aerial survey was, of course, known before the last war, but the necessity for examining enemy territory by photographs greatly improved facilities and technique. These pictures show some of the steps involved.

THE first step is to fit suitable aircraft with specially developed cameras. The aircraft ideally should be steadied in flight, speed, at least in peace time, being average to slow rather than otherwise.

The aircraft methodically sweeps across the survey area, keeping constant height, and at the same time, the camera makes regular exposures so that the edges of successive pictures have appropriate overlap.

When the flight is completed, the



The latest in survey cameras produced in England—the Williamson Photogrammetrical Air Camera, Type OSC Mark I.

films are developed and dried under careful control, to ensure that the image is subject to as little shrinkage as possible. After drying, each exposure is individually printed in order to compensate for variations in lighting, type of terrain, etc.

The prints are then laid out on the floor, in order, and so assembled that they make up what is virtually one large picture of the area which was surveyed.

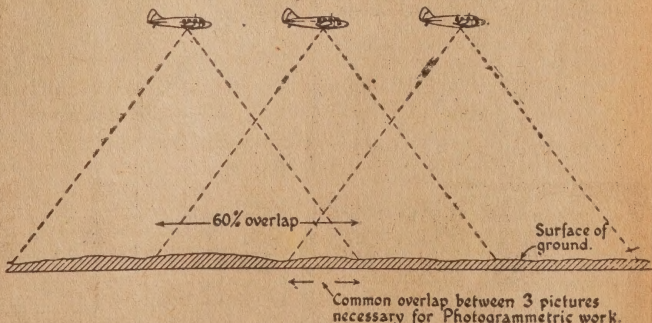
Apart from the convenience of being able to examine sections in detail, trained operatives may now build an accurate model of the area, as shown in the picture on page 3. The use of stereo photographs allow her to obtain information concerning heights, and other details to make her model accurate in every respect. Foliage, buildings, etc., may all be reproduced and colored.

The final model gives a general assessment which could not possibly be obtained as well by any other method, and with a very great saving in time.



Plotters are those who illustrate on a map the area covered by each, or by a run or runs of prints. Here the plotter has laid out three long runs taken from an air survey in Iraq. The preliminary object is to determine whether there are any gaps not adequately covered by the photographs. The area shown by those three runs is that North-west of Kirkuk, is an oil bearing anticline (made up of the Fars and Bakhtiari series) which forms a long range of mountains running NW-SE on either side of Kirkuk.

Position of Aeroplane for 3 successive exposures

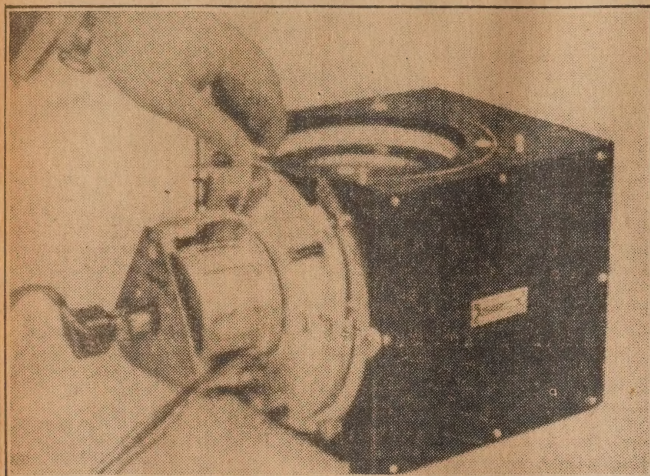


Our diagram shows the principle of aerial survey, namely that exposures are made at intervals, sufficient to give the overlapping (that is, the area in common) between pictures.



Technical Review

A COMPACT PROJECTOR FOR HOME TELEVISION



A recent adaptation of the Schmidt Optical System permits the design of a compact projection box using a 2.5" cathode-ray tube giving a 12" x 16" picture. The novel corrective lens is made from gelatine sealed between glass plates, while the power is derived from a 25KV voltage tripling supply.

EXPERIENCE with postwar commercial television has emphasized the desirability of larger pictures than can be produced at present by direct-viewing tubes of convenient size.

The alternative method of producing a large television picture by optical projection of the image from a small, high intensity screen has always held interesting possibilities. However, the need for adequate picture brightness sets certain limitations on the minimum practicable tube size and, at the same time, demands a large aperture optical system. Because of this, projection systems have thus far not greatly reduced the space required for direct viewing tubes, although somewhat more freedom is allowed in disposition of space.

A further difficulty has been that the projection of a sufficiently bright, well-defined image from a small tube has demanded an acceleration voltage considerably in excess of that used for direct-viewing tubes.

Further development of the projection system has resulted in this new arrangement known as the "Proelgram." It is described in the April

1948 issue of "Electronics" by H. G. Boyle and E. B. Doll, of the North American Philips Company.

The initial image is formed on the screen of a 2½" diameter tube, which has been shown to be the minimum practicable size. Magnetic focus and deflection, the moderate deflection

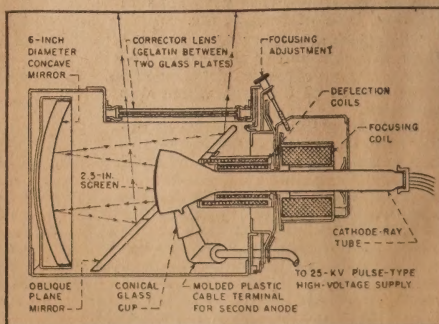
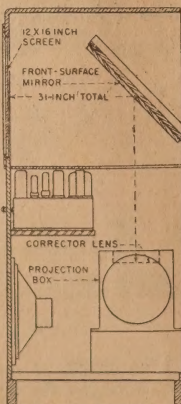
angle and an acceleration potential of 25KV permits the design of an electron gun which produces a 0.003" diameter spot at the tube face. Allowing for optical magnification, this permits adequate resolution for a 525 line television system. The degree of elimination is also adequate for a 12" x 16" projected picture.

The projection tube has an overall length of 10.5" and the face on which the phosphor screen is deposited is an accurately defined spherical surface meeting the requirements of the Schmidt Optical System. A special blend of phosphor powder produces a visually pleasing shade of white.

The mechanical arrangement of the projection-box is illustrated below and it will be noted that an oblique mirror is used to project the picture upwards by a path which is quite clear of the focusing and deflection coils around the neck of the tube. Adjustments are provided on the various surfaces to obtain correct focusing &c.

A point of particular interest is the aspherical corrective lens, which is manufactured by a new and simple process. The liquid gelatine is poured into a mould which has a specially exaggerated contour. One part of the mould is a polished glass plate to which the gelatine adheres firmly, and, as the water dries out, the gelatine contracts by a known amount to assume the exact required contour.

When the mould plate is removed, the face of the gelatine is protected by a second sheet of polished glass and the result is a lens which will withstand normal handling.



These drawings show the physical arrangement of components in the projection-box and a typical method of installation in a console cabinet.

COSMIC AND SOLAR RADIO NOISE ANALYSIS

Scientists of the US Standards Bureau are initiating a project for the observation and analysis of radio noise generated by the sun, a companion project to cosmic radio noise studies already in progress. The new investigation will seek to determine the range of frequencies broadcast from the sun, received intensities, and the correlation of solar noise with other solar, interstellar, and terrestrial phenomena.

TWO giant radar mirrors at the Bureau's radio propagation laboratory at Sterling, Va., will intercept and record solar noise reaching the earth. These devices are particularly suitable for the investigation because of their size. The reflectors, about 25 feet in diameter, allow the capture of a large amount of energy from solar broadcasts. By automatic control, the mirrors will be directed at the sun constantly throughout the day.

The first receiver is now in process of installation and will be used, initially, for studies in the 480 to 500 megacycle band.

With the use of higher and higher frequencies in communication and radar equipment, both solar and cosmic noise have come to be recognized as increasingly important. Recent advances in design for both very high and ultra-high-frequency receivers, which practically eliminate internal set noise, indicate that the

limiting factors in the use of the equipment will be those arising from natural phenomena.

Three general types of external noise that affect radio reception are of scientific interest. The first is atmospheric radio noise or "static," originating within the earth's atmosphere, which, with its characteristic crackle and crash, is familiar to every radio listener. This type of noise is actually the reception of radio energy produced by a lightning discharge. Extreme and prolonged static in the North American continent is generated for the most part



in the Caribbean and South American thunderstorm regions. Individual flashes of lightning not only accumulate to produce almost steady noise, but also are transmitted over long distances in exactly the same fashion as man-made signals.

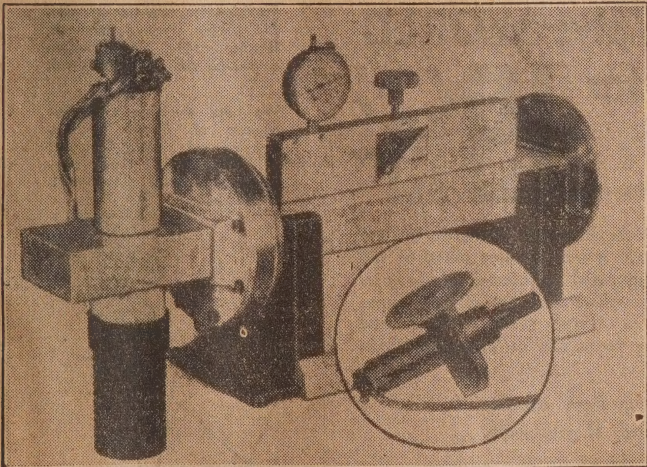
Atmospheric radio noise ceases to be a major problem above about 15 megacycles, but it is at this frequency that cosmic noise becomes noticeable. Unlike the radio noise of terrestrial origin, cosmic radio noise exists as a low steady hiss. In the case of FM equipment the FM signal itself tends to suppress this noise within a certain range of the transmitting station. However, as distance from the station increases, the ratio between the strengths of the competing signals changes in the favor of cosmic noise until it completely drowns out the FM signal. The main centre for the generation of cosmic noise is the constellation Sagittarius in the Milky Way. Because of this, there is a slow change in the noise intensity as the position of the earth changes relative to the constellation.

EFFECT OF STARS

Because of the similarity of the sound produced in the receiver, it has been suggested that cosmic noise may be due to radiation emitted by the thermal agitation of charged particles. The stars of the Milky Way throw off a large amount of material, which expands and tends to fill the intervening space as a very tenuous gas. Under the action of starlight, these atoms of gas are ionised with the production of positively and negatively charged particles, which radiate visible light and may also serve as sources of radio radiation.

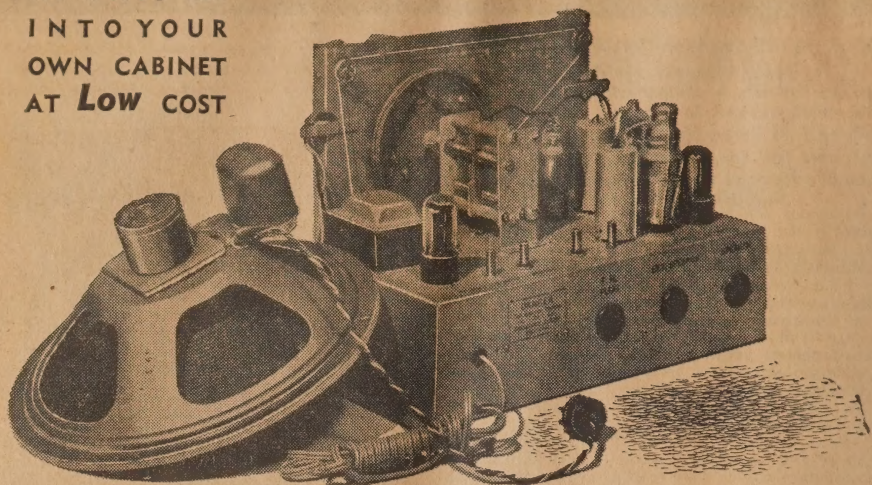
(Continued on Page 11)

MICRO-WAVES WITH STANDARD VALVES



Microwave generation with conventional tubes was demonstrated by DeMornay Budd Inc. at the recent IRE (US) Convention. Development is expected to expand vastly the use of microwave equipment, which has been hampered by the necessity of designing it around the scarce and expensive Klystrons and magnetrons. Previously, ordinary tubes, available for other purposes, have been considered unsuitable for microwave generation because of excessive transit time and grid condutance. This development overcomes these two problems by making the transit time between cathode and plate correspond to some multiple of 360 degrees phase shift. An alternate development achieves similar results by making the transit time correspond to any odd number of half periods of oscillation. The potentialities for this development are considered to be an "open sesame" to the very roomy microwave region for amateur, citizens and mobile bands, relay and communication and navigation functions.

FIT THIS SET
INTO YOUR
OWN CABINET
AT **Low** COST



ANNOUNCING THE RELIANCE

Sky Knight

FULL SIZE 5-Valve WORLD
RANGE UNIT for

£19'19'-

- Completely assembled and Tested.
- Using Standard Components.
- Easy terms in Metropolitan area of Sydney

This new Sky Knight foundation unit should prove a boon to anyone interested in building their own set. It incorporates many of the features that have made the Sky Raider and Sky Master sets famous. Standard components are used throughout and the chassis comes to you completely assembled and pre-tested, ready to be placed in a full size console cabinet. Easy terms can be arranged within the Metropolitan area of Sydney.

*We can supply a modern console
or Radiogram cabinet if you wish.*

Call in and see the Sky Knight at our only address.

RELIANCE RADIO

10 BARRACK ST., NEXT TO LOTTERY OFFICE

Telephone: BX2691-2-3.

Here are the Sky Knight Features:

The Sky Knight is a full size 5-valve World Range unit. Complete with 12 inch Permago. Speaker.

★

Standardized components have been built-in to a modern tested circuit. Valves included.

★

Provision for extension speaker. FM plug-in. Pick-up terminals. Gramo switch. Large modern calibrated dial. Flywheel drive.

★

We have available a limited number of Electric motors. Pick-ups and Record Changers of best imported types, supplied at special prices with chassis units.



"YOU can be sure of THE door."

COSMIC NOISE

(Continued from Page 9)

Solar noise, which appears at ultra-high frequencies, has a basic component much like cosmic noise—a steady hiss. However, it also has an undulating component superimposed upon the stable noise. These variations are sometimes of great rapidity and manifest themselves in the form of "puffs" and "swishes" lasting a second or less. The swishes may overlap, giving rise to a grinding noise, which may cause streaking on a television screen and picture jumpiness. Intense bursts of solar transmission that last as long as several hours cause a radar to become blind when pointed in the direction of the sun.

In the field of cosmic noise, the two chief problems to be solved are the determination of the intensity-versus-frequency of the radiation and a more accurate survey of intensity versus position at a variety of frequencies. Both of these problems are being attacked at the Bureau. To investigate the first, a series of measurements are being made over the frequency range from 25 to 110 megacycles by means of a battery of specially designed receivers, each tuned to a particular frequency. The second problem requires the highest possible resolving power which may be obtained either by going to higher frequencies or by using larger collectors. Both lines of attack are to be employed.

Comprehensive data on radio waves of celestial origin are expected to be useful in several applications. For example, a radio sextant might be built to determine position from the direction of arrival of solar noise. This device would permit navigation by the sun even though the sky is overcast and would have some advantage over loran in that it would be completely independent of ground stations. It may also be possible, by analysis of the direction and intensity of cosmic noise, to study details of the Milky Way that cannot readily be investigated by the astronomer's telescope.

TABLE TELEVISERS

TABLE MODEL TELEVISERS will outsell consoles almost 2 to 1 during the next year, according to 64 New York dealers queried in a survey sponsored by Allen B. DuMont Laboratories.

According to the survey, table-top models are expected to account for 63.3 per cent. and consoles for 36.7 per cent. of total set sales. In the dealers' opinion, 57.2 per cent. of all television receivers sold during the next twelve months will have television only; 20.8 per cent. of the units sold will have television in combination with FM and AM; and 22 per cent. will have television with AM, FM, and phonograph.

Eighty-eight per cent. of the dealers in the survey noted that in making purchasing decisions, male customers have the most say about the brand.

RCA LOUDSPEAKER SYSTEM

Recent RCA advertisements in overseas magazines have carried details of a loudspeaker system which has an excellent frequency response, suitable for FM monitoring, and a very pleasing cabinet style. The speaker sells in the US for 70 dollars, complete outfit for 290 dollars.

BASIS of the whole system is a new RCA duo-cone loudspeaker employing separate voice coils for the high and low frequency components.

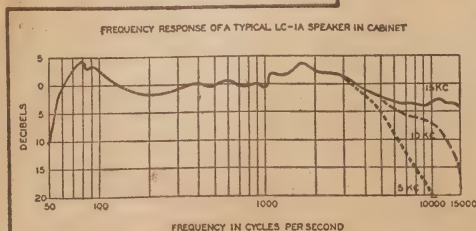
The low frequency unit is a large diameter voice coil approximately 2½ in. actuating a 15ft. diaphragm. This has a naturally resonant frequency of 35 cycles.

The high frequency unit is mounted inside the low frequency voice coil structure and has a cone of 2 3/8 in. diameter which follows the shallow angle of the larger cone. It is actuated by an aluminium voice coil of exceptionally low mass, which is claimed to radiate a full power pattern over an angle of 120 degrees at 15,000 cycles.

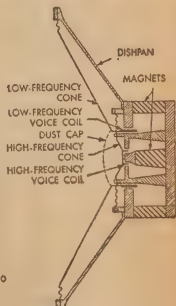
The composite curve of the loudspeaker, reproduced below shows a response which is within plus or minus 5 decibels from just over 50 to 15,000 cycles per second. The cone resonance at 35 cycles naturally holds up the response on this very low frequency. The composite cone arrangement is claimed to eliminate undesirable interference between units over the cross-over range, while the high frequency radiation pattern is said to be unique.

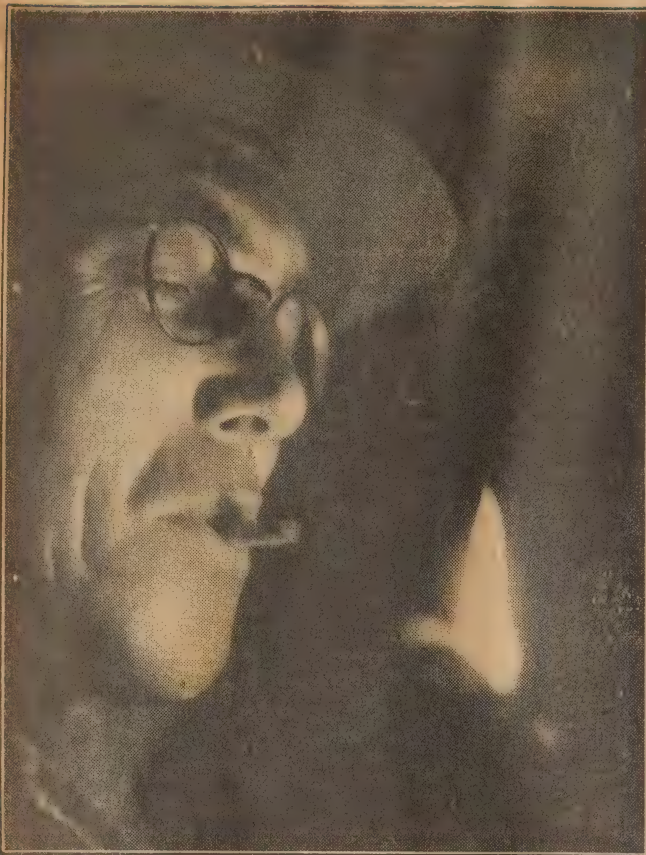
Under average listening conditions some recordings may not be acceptable with the full frequency range in operation and a filter system is provided in the complete installation giving two degrees of treble attenuation. These are shown in the

curve. The cabinet is a base reflex type, otherwise known as a vented enclosure, about which information was given in the last issue of Radio and Hobbies. The styling may be of particular interest to those who contemplate construction of such a cabinet for use in the home. Note the frequency control switches recessed into the side.



This diagram shows the structure of the RCA LC-1A speaker and its response in a reflex baffle.





any positive conclusion regarding the nature of light.

Light was first thought to be a series of waves in the "ether." This conception of light held sway for many years, and even today, the wave theory, widened to embrace an additional idea that the waves are bunches of particles, is the mainstay of all investigators.

What these particles are, nobody knows. They have never been seen. How, then do we support this theory? By the simple expedient of observing that light is subject to the force of gravity, of which more anon.

Normally, light travels in straight lines, and this property is unconsciously used by us at all times. It enables us to find our way from one place to another, and to walk through the front gate without hitting the gate post. It enables one to find the keyhole without effort under normal circumstances.

EYE FOLLOWS LIGHT

These accomplishments are brought about by the eye actually following the lines of light reflected from the objects around us. Were it otherwise some very awkward situations would arise. For instance, instead of kissing your wife goodbye, you might kiss the dog standing alongside, or the door post, or even the lady next door.

The speed of light, namely 186,000

The glow from a lighted match, the blaze of sunset, the radiance of the stars, are all evidence of light rays without which our world would in very truth stand still

THE MAGIC OF LIGHT WAVES

The vast extent of the "wave spectrum" covers all kinds of radiation such as heat, sound, light, radio, x-ray etc. Against that rather general statement, our correspondent has written this article on the study of light, and its relationship to the spectrum.

THE nature of light has ever been a puzzle to scientists. Today we seem to be no nearer the solution of the problem than were the ancient Greeks, to whom light was a mass of particles emitted by visible objects.

It is true we now know that vision is a characteristic of the eye rather than of the object seen, and we know that visible objects do not necessarily emit light waves.

We also are aware of the behavior

of light. Most theories of the nature of light are formulated on a basis of that knowledge, but, as with many other theories, there is no practical evidence which leads us to

by Calvin
Walters

miles per second, has been termed the speed limit of the universe. Nothing in nature has been found which exceeds this speed.

The velocity of light was first determined approximately as long ago as 1849 by a Frenchman, Armand Fizeau. He used an ingenious contrivance consisting of a sort of cog-wheel. Through the spaces between two teeth, light went out from a source in a high tower. About five miles away another tower was furnished with a mirror, which reflected the light back again to its source.

When the wheel was at rest the light came back through the same opening through which it was emitted. But when the wheel was revolved at a certain speed it was found that a tooth of the wheel had blocked up the space and no light

was received from the reflecting station.

By simple deduction it can be seen that the time taken by the light to travel from its source to the reflector and back again was the same time taken by a tooth of the wheel to move into the opening. Doubling the speed of the wheel enabled Fizeau to again see the light because the tooth had moved away from the opening. Using a speedometer he observed the speed of the wheel and could thus calculate the time taken for the light to travel between the towers and back again.

A similar method of calculation is in use to this day, and the scientist, Michelson, used it to make a very accurate calculation. In this case the light travelled a distance of 44 miles, and instead of a toothed wheel an eight-sided mirror was used. The speed of light was found to be 186,281 miles per second.

LIGHT RANGE

Light has an enormous range, and nothing better can illustrate this than the light from the stars.

The light from the sun takes 500 seconds to do the 93 millions of miles trip. Imagine, therefore, the distance light would travel in 500 millions of years. It can be found by multiplying the number of seconds in a year by 186,000. You work it out. It's too late for me tonight.

Yet scientists have actually seen and photographed such light. We have all seen this much travelled light. In fact, we see it every evening, for, when we look into the sky and pick out the faintest of those hazy looking star clusters, we are looking at light which left that particular cluster millions of years ago. For all we know the cluster may have gone out of existence a million or so years ago, and the light which left it at that time is still travelling into outer space. Astronomers are still looking at something which does not exist. It is paradoxical, but true.

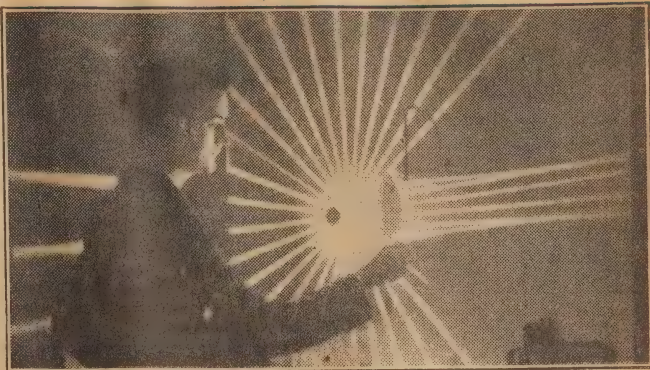
That light can be reflected is fortunate for us, for, without reflection, no object which was not self-luminous would be seen. The world would be black—a good deal blacker than it is now.

Reflection of light is responsible for color. Color is nothing more than the reflection by objects of light of specific wavelengths.

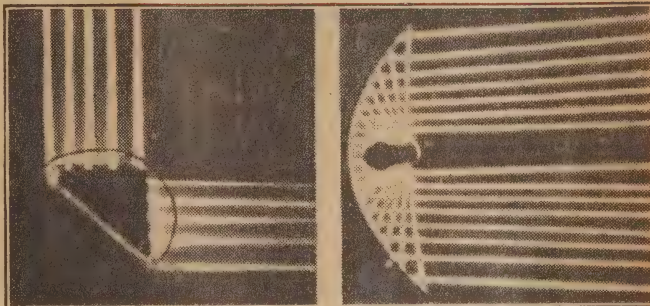
LIGHT AND SPECTRUM

Light is part of a system of wavelengths, embracing the waves which carry our broadcasting programmes, down to the cosmic waves. The former are miles long and the latter are microscopically short. In between these are the waves of visible light, infra red waves, ultra violet, X-rays, etc. All these waves are electromagnetic in character, and light waves are situated between the infra red waves at about the centre of the wave scale, with rays lower down. Light waves are from 16 to 32 millionths of an inch long.

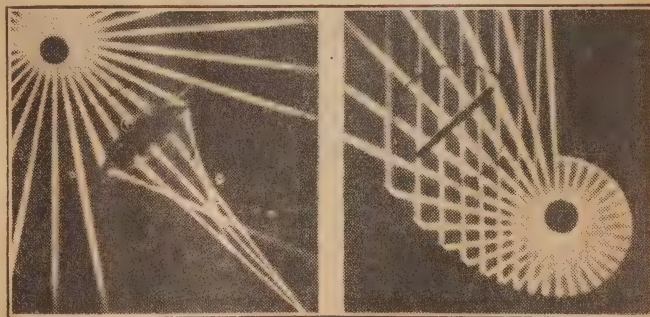
EXAMINING BEHAVIOUR OF LIGHT



In General Electric's controlscope, light engineers can . . .



bend light with a prism . . . focus it in concave mirrors . . .



and through convex lenses . . . or scramble it in parabolas.

This visible spectrum of light consists of the colors which are waves of varying length. The reason an object appears, say, blue, is because that object absorbs the waves of all other colors and reflects the waves of blue.

Mirrors depend for their utility value on the reflecting properties of light, and here we are introduced to refraction.

It is well-known that light can be

bent around corners. This is often seen when a stick is poked into a pond. The stick appears to be bent. This is caused by the slowing down of the speed of light when it enters a medium other than air such as glass or water.

It is this that makes fish-spearing so difficult to the unskilled, for when you look at a fish in water he isn't there at all, he is somewhere thereabouts, but not there.



PHILIPS

AIR TRIMMER CONDENSERS

Air is the ideal dielectric in a capacitor. Philips Air Dielectric Trimmer Condensers offer the engineer the simplest and most effective solution of his R.F. design and production problems.

CHARACTERISTIC PROPERTIES

- Great capacity constancy; due to the sturdy construction the condensers do not get out of adjustment through jolts during transport nor through other causes.
- Well thought-out design, so that re-trimming can be effected rapidly and with great accuracy.
- Excellent H.F. characteristics.
- Reliable contact of the rotor, even after sealing the trimmer.
- No damage when turned in or out too far during adjustment.
- Insensitivity to humidity and high temperature.
- Small dimensions with light weight; consequently easy mounting.

DATA

| | TYPE 7864 | UNIT |
|--|--------------|---------------|
| Max. capacity | 30 | μF |
| Min. capacity | <3 | μF |
| Control range | 27 | μF |
| Total rotation angle | 1080 | degrees |
| Capacity curve | linear | |
| Insulation resistance | >30,000 | megohms |
| Parallel damping measured at 200 m and a capacity of | 15 | μF |
| Highest working temperature | 60° | C |
| Test voltage | 300 | V = |
| Diameter | 12.5 | mm |
| Weight (approx.) | 5.8 | g |

PHILIPS ELECTRICAL INDUSTRIES OF AUSTRALIA
PTY. LIMITED

Sydney . . Melbourne . . Brisbane . . Adelaide . . Perth

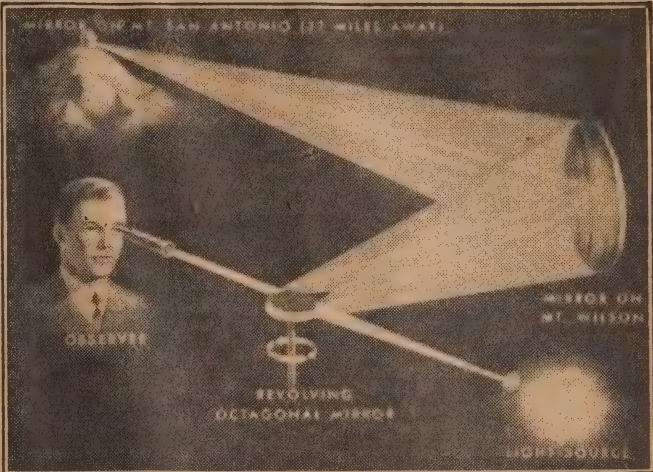
where you think. He doesn't know this, but it is handy to him, nevertheless, unless you get right under the water. Things are a bit different then because the light is evenly diffused.

This sort of thing also makes it a bit difficult if you lose your false teeth in the water while swimming. You can put your hand down in the water to, grab for them, but, most likely, you will only grab a shell or something, while there, a bit to the right or left, are your teeth grinning at you and gnashing themselves in derision.

ACTION OF MIRROR

In a mirror, the combination of reflection and refraction takes place when light strikes the surface of the glass. It is bent in another direction, reflected back from the silvered surface and bent back again through the glass to the surface. The distortion seen in mirrors of uneven surface is caused by the glass varying in thickness.

When light strikes a reflecting surface, it is reflected at the same angle at which it struck that surface. That is why it is possible to see objects in a mirror which are not directly in front of it. So long as light re-



different angle so that the light will emerge from the prism at different angles and appear as a strip or "spectrum" of light consisting of colored bands representing the different wavelengths.

The rainbow is caused by refraction of light through raindrops, which act as prisms.

In addition to being reflected and refracted, light is subject to diffraction. This means that it bends when it comes close to some obstruction.

A simple experiment can be tried to illustrate this diffraction. Take an ordinary comb and lay it upon this printed sheet. The letters of the words beneath the comb appear larger than the uncovered letters. This is caused by the rays of light reflected from the page spreading out as they pass the obstruction of the comb's teeth. The letters therefore appear larger.

This property of diffraction is made use of in what is called the "diffraction grating" used by astronomers. In its simplest form it consists of a transparent glass plate on which are scratched by means of a

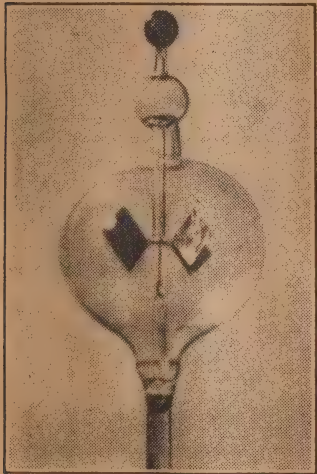
Michelson measured light speed with an 8-sided mirror. Only when the mirror made $\frac{1}{8}$ revolution and reflected light travelled a total of 44 miles did the observer see light. As the speed of the mirror was known, calculation from these figures gave a speed of 186,281 miles per second.

diamond point a series of parallel lines some 40,000 to the inch.

In passing through the pane of glass the light rays come close to one of these opaque scratches and are bent slightly out of course. Thus light coming through each transparent space between the lines is bent and interferes with the light coming through other spaces. The resultant additions and cancellations in wavelengths produce colors which represent all the wavelengths of the original light.

The diffraction grating is used to determine the speed of motion and composition of heavenly bodies. The methods used will be the subject of a future article.

Mention was made earlier that light is subject to the force of gravity. This proposition was first put forward by Einstein many years ago



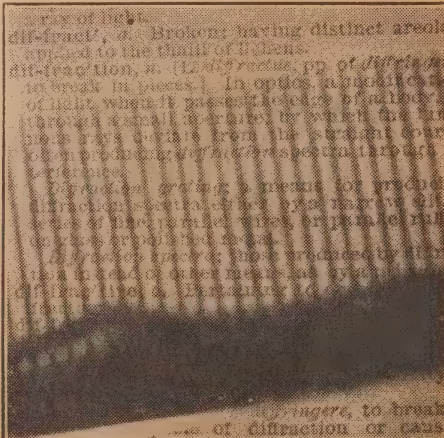
This simple device, often seen in display windows, revolves because light bounces from silvered surfaces of vanes, but only partially from block surfaces. It shows the existence of "light pressure."

lected from an object can reach the mirror, the object will be seen in the mirror.

Refraction makes possible the focusing of telescopes and cameras because the light enters at certain angles and leaves at others. The optician works out the kind of glasses to give you by the laws of refraction.

The scientific instrument known as the spectroscope is based on the laws of refraction. It uses a prism of glass through which a given light from some specific source is made to pass. Waves of light of different lengths are bent or refracted at a

The fact that the letters under the comb seem larger than the others is because the rays beneath the teeth tend to spread out, demonstrating refraction.





IF

FM

COMES!

Some day Frequency Modulated broadcasting may come into general service in Australia, but when, even the experts refuse to forecast. At Rola the position is being closely watched, and if FM is ever introduced in Australia on a commercial scale, Rola will be ready to provide the special loudspeakers which FM receivers may need. Rola's engineering skill and its extensive knowledge of loudspeaker design has already been responsible for many major improvements in sound reproducers. Rola led the world in the introduction of the Isocore transformer and was one of the first loudspeaker manufacturers to appreciate and apply the advantages of the wartime-developed Anisotropic Alnico. These and other important improvements, including external suspension of the cone and a patented method of cone alignment are reason why Rola loudspeakers are used in more than 80 per cent. of Australian radios.

FM may come in the future, but today, as for many years past, Australian-made Rola loudspeakers are a "must" in all high-quality receivers.

ROLA

LOUDSPEAKERS with ANISOTROPIC ALNICO



GEO. BROWN & CO. PTY. LTD.,
267 CLARENCE STREET, SYDNEY.

JOHN MARTIN PTY. LTD.,
116-118 CLARENCE STREET, SYDNEY.

Rola Co. (Aust.) Pty. Ltd., The Boulevard. Richmond, Vic. and 116 Clarence Street, Sydney, N.S.W.

and has subsequently been proved correct.

The proof lay in the fact that during an eclipse of the sun a star, photographed during the eclipse and when it was close to the sun, was found to be out of position as compared to a photograph of the same star taken at night time when the sun was not in close proximity. This proved that the light rays were subject to the attraction of the pull of the sun.

This seemed to illustrate that light consisted of particles of matter. This matter cannot be very tangible for light travels best through a void.

LIGHT RAY ENERGY

That there is considerable energy and force in a light ray is shown by its action on the photo electric cell or electric eye, as it is commonly called. These cells are coated inside with a substance which is sensitive to light. When a light ray strikes the substance, electrons are knocked out of each atom of the sensitive substance. The brighter the light the more electrons are knocked out. It therefore would seem that particles of matter would be required to bring about this destruction.

The latest theory has produced the "photon," small bundles of matter which form themselves into groups which in turn form the electro magnetic wave called light. The photon has never been seen and it is merely an expedient to combine the accepted wave theory of light with the newer and highly probable theory of particles.

Honey in Technicolor

GREEN-COLORED honey with the tang of mint leaves! That's just one of the six flavors of honey, each of them appropriately colored, produced at the Corning, Calif., apiary of E. C. Close. The beekeeper has applied for a patent on his process to produce flavored and colored honeys.

Through this process he manufactures honey in strawberry, pineapple, chocolate, lemon, maple and mint flavors. Close keeps his bees in electrically heated hives. He tricks the bees into turning out flavored honey by flavoring and coloring the syrup and pollen which he feeds them.

Plastic Flooring

A new floor covering similar to linoleum is made of plastic and requires no waxing. It is being produced in the US and comes in roll form six feet wide. More flexible than linoleum, it is non-porous and resistant to chemical action. The material is Vinylite plastic, laminated to a felt back with the design running through the entire thickness of the plastic. It is laid in the same manner as linoleum. A wall covering made of plastic, which also resists chemical action is available in the same colors and patterns as the floor covering. It can be bent at sharp angles without showing surface cracks.

SCIENCE NOTES—Prof. A. M. LOW

It is fascinating to think that everything is held together by electric forces, and that our bodies are mostly space which we cannot see. And there is this queer thing, that on the surface of liquids there is an added attraction which produces a kind of hard skin or a form of "surface tension."

COLLOIDAL chemistry has shown us how particles of gold can be so small as to stay suspended in water, but surface attraction is quite another story, and if you take a perfectly dry needle and drop it very close to the surface of some water, keeping it absolutely level, it will commonly float. Reminiscent, in fact, of some forms of these new military bridges.

A still more striking example is shown by covering the surface of a bowl of water with the lycopodium powder which comes from a moss found in Russia. These particles are so small that their "tension value" is very high, and you can plunge your hand into the bowl of water, through the skin of thin particles, without it becoming wet in any way.

DON'T BE CAUGHT

It is very difficult to observe any occurrences accurately. You will find that if three people in front of, say, twelve, are watched in a simple action such as one man dropping a bunch of keys, one kicking it, and one returning it to the first man, and the three then sitting down in different order, every single person in the audience will give a different account of the performance. Or very nearly so. This is why road accidents cause so much apparent lying. Anyway, it is one kindly reason.

The camera now being used to judge racing is the only real method unless we have some electronic recorder, which I hope will be used one day for voting. These high-speed cameras are fascinating things, and I observe that they have now introduced a revolving winning post, so that it will not interfere too much with the lines of sight but appear stationary as the camera clicks.

DOES IT, OR DO I?

Very embarrassing for the onlookers who might be in the unhappy position of the man who entered a ballroom which had a sprung floor. He had dined adequately and was heard to mutter "does it, or am I?"

But high-speed cameras do show what happens if you break an electric light bulb with a hammer. The side opposite to the hammer usually falls out first because the column of gas inside pokes it out before the hammer has time to penetrate the fracture.

It was once argued in court that a certain photograph had been taken wrongly because the flash made by the photographer startled a man holding a screen. No one noticed it at the time, but counsel should have pointed out that the flash would be

over long before the screen could have been dropped. The exposure which resulted was not only that of a film! A tricky point for the judge, was it not?

TOO DANGEROUS

There seem to have been a sad number of railway accidents of late, and it is rather a reflection on civilisation that scientific methods should take so long to apply. Buildings burn down when almost fireproof methods are available. Trains could travel fast through fog if radar equipped. Animals do not run into each other in the dark because they have senses which indicate the presence of others. We, by living in cities, eating tinned food, wearing clothes and shaving (all very necessary so that we can think better) require mechanical aids to our senses and I suggest quite seriously that in the very far geological future human beings will have no hair, no teeth, and very poor hearing. They will aid these senses electrically. Eyes will also be helped, and it seems very probable that legs will become atrophied. Indeed, I think it is best that we should try to forge our bodies, for the whole purpose of education, almost of life itself, is to improve our minds and forget our unpleasant physical attributes.

TABLOID MEALS

You will notice I do not speak of tabloid meals. They will come, but our stomachs at present must be worked mechanically as well as by their usual metabolism or else their works get rusty and the nasty diseases of civilisation appear. Even now we take a poor view of those who gorge red steaks, and we are a little ashamed of boasting the sideboard was groaning with pieces of animals.

It will not be long before mechanical hearts and other parts become common. How fascinating to think that brains might live without a the concomitant horrors which we now love for want of knowing better. We are still so savage that we can only communicate a thought by blowing air through a set of wagging lips.

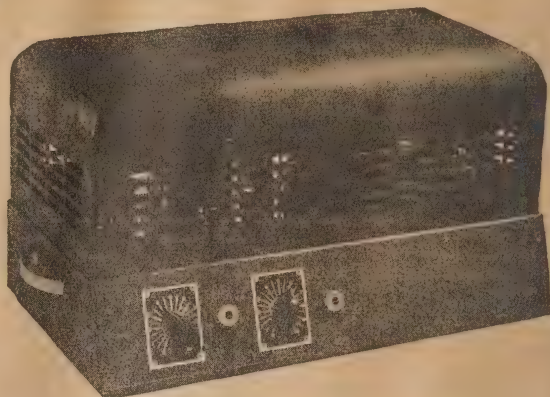
THE VORTEX BOX

Take any box about 8 in. long and the same in width. Glue some piece of paper tightly over the open side and in the opposite part cut a hole 1 in. in diameter. When filled with smoke you can send vortex rings across the room or put out a candle if the box is sufficiently large.

AMPLIFIERS Complete, or Kits...

★ 45 Watt. Super Power P.A. Amplifier

Designed specially for large outdoor gatherings and factories. Will operate at least six horn type P.A. speakers, or twelve 8" speakers. In addition to high power, the fidelity of this unit for music is extremely high. (Appearance as illustrated.)



★ 20 WATT ALL PURPOSE FIDELITY AMPLIFIER

This amplifier originally designed for high fidelity has also proved most popular for P.A. work, such as outdoor meetings, dances, etc. Will safely handle three horn type P.A. Speakers, or at least six 8" speakers (Appearance as illustrated).

★ 15 WATT ULTRA HIGH FIDELITY AMPLIFIER

For its low cost this, to our knowledge, is the finest high fidelity unit ever produced. Employing push-pull triodes this amplifier is virtually distortion free. Music-lovers will hail it as the amplifier of their dreams. (Appearance as illustrated).

★ 12 WATT "VOX MAJOR" AMPLIFIER

Originally described by "R. & H.", this amplifier combines compactness and economy with adequate power output. Primarily designed for record reproduction in the home or for a small hall.

★ 10 WATT GENERAL PURPOSE AMPLIFIER

Although suitable for small outdoor functions this amplifier was designed primarily for indoor P.A. work. For those who require an efficient, medium power, low cost amplifier, this 10 watt is the answer. (Appearance as illustrated).

★ 4.5 WATT "VOX MINOR" AMPLIFIER

Originally described by "R. & H.," the "Vox Minor" is the ideal amplifier for record reproduction in the home. It is an excellent unit for the experimenter, particularly in view of its very low cost.

★ 13.5 WATT P.A. VIBRATOR AMPLIFIER

For the country man, or in locations where A.C. power is not available, this 13.5 watt is the answer. Operates from 12 volt batteries, and is suitable for quite large outdoor functions. (Appearance as illustrated).

★ 4 WATT "VIBRAVOX" VIBRATOR AMPLIFIER

Another "R. & H." design, this small unit is ideal for the country man where home record reproduction is desired. Also highly suitable for amplifying small halls. Fidelity is equally as high as A.C. units of equivalent power output.

**ELECTRONIC PARTS
PTY. LTD.**

E.S. and A. Bank Building.
BROADWAY, N.S.W.
Phone: MA1661
Telegrams: ELECPARTS SYDNEY.

Circuits and building hints supplied with all kits.

Prices available upon request.

WHOLESALE DISTRIBUTORS OF EVERYTHING IN RADIO

OIL CAN REPLACE COAL IN LOCOS

SAVINGS amounting in some cases to more than a thousand tons of coal a year for each locomotive are effected by conversion to oil fuel.

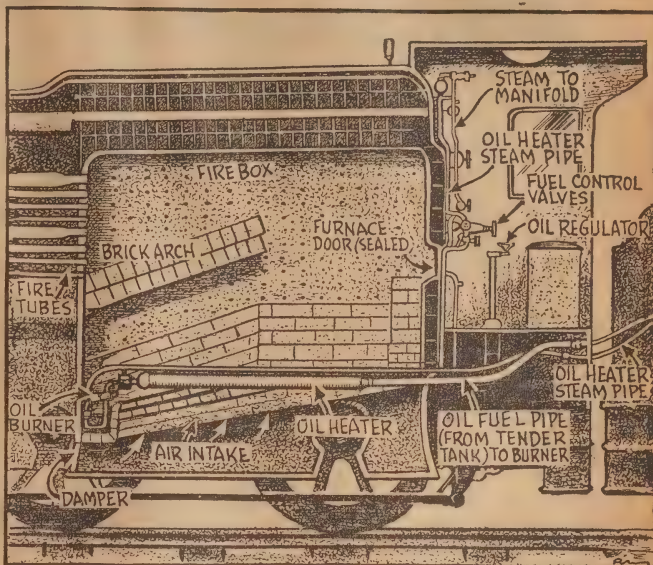
It has been shown that oil has many advantages over coal as a locomotive fuel. First, it is easier to light; second, it simplifies the task of cleaning the locomotives; and thirdly, there are no ashes to be removed or clinkers to be removed from firebricks.

Servicing becomes a quick and simple job, and it has been estimated that there is a saving in time of five hours or so after every six-hour run.

The oil is carried in a tank on the tender, replacing the usual coal bunker. The oil is warmed by steam coils in a small tank in the tender, and it is then fed by gravity to a heating cylinder and from there to the single burner in the firebox, as shown in the general diagram-sketch of the layout of the furnace in an oil-fired engine.

The burner (shown in the detail sketch) is designed as a steam-activated oil jet. A steam jet is directed towards the nozzle, and passes across the end of the oil pipe, down which oil feeds by gravity. The oil is atomised and forced through the nozzle in a very fine spray which burns in the firebox.

As can be seen, little conversion work is needed in the locomotive to change over to oil. Control mechanism is more complicated, however, as oil-fuel regulators and control valves are required in addition to the usual steam control.



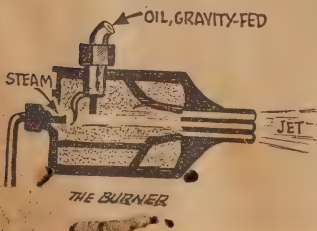
Shortage of coal has become a more and more pressing problem in most countries since the end of the war, and conversion of coal-burning locomotives to oil has been undertaken in a number of countries, including Australia.

The fireman is relieved of the heavy work of coal-shovelling, and can spend more time watching the fire and giving attention to gauges and valves.

The fire of an oil-fed locomotive

is lighted in a few seconds by inserting a flaming paraffin-soaked rag into the firebox.

Consumption of the coal and fuel oil is approximately the same by weight.



VALUABLE GERMAN METAL ALLOY

A FORMER German magnetic alloy, particularly suitable for use in rectifiers to change alternating electric current into direct current, has now been produced for the first time in the United States at the Naval Ordnance Laboratory, White Oak, Md., the Department of the Navy revealed.

This valuable alloy, known as Permenorm 5000-Z, is a result of fusion of nickel and iron under an intricate heat-treatment process. It was first made in Germany in 1943, where it was applied in the electrochemical industry in the construction of huge rectifiers.

Unfinished samples of the new alloy were brought to this country after the close of the war by American scientists, and distributed to American governmental and industrial laboratories to be duplicated for domestic uses. Although details of the process were available, no laboratory until now was successful in producing the type of alloy which

had the required magnetic properties.

Permenorm 5000-Z has important applications in the fabrication of magnetic amplifiers to give additional strength to feeble electric pulses. Employed for this purpose it may replace many of the complicated, delicate and troublesome electronic tube amplifiers now used in guided missiles, equipment to control gun firing, and underwater ordnance.

Credit for the reproduction of the alloy and its new applications goes to Dr. Gustaf W. Elmen and Edward A. Gaugler, physicists at the Naval Ordnance Laboratory. Dr. Elmen, well known as the inventor of other magnetic alloys, served as consultant, while Mr. Gaugler was active in charge of the project. At a scientific meeting to discuss magnetic materials, to be held at the Naval laboratory in the near future, the Permenorm development will be described at length.

RADIO BOOKS

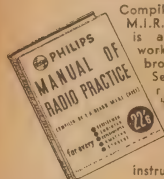


1. AUSTRALIAN OFFICIAL RADIO SERVICE MANUAL. Volume 5—Circuit Book of Standard 1946 Receivers.

First produced in 1937, this publication has become the sole means available to the serviceman of obtaining year by year circuit data of Australia's standard receivers within the covers of one volume. 376 pages. 15/- (post 8d.)

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Written by F. J. Camm, this book is the MANUAL of radio servicing. Simple testing for the amateur and modern methods for the professional. Covers all faults and quick diagnosis. 13/9 (post 5d.)

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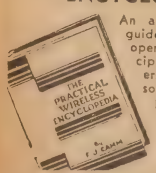
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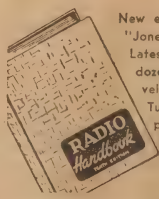
An alphabetically compiled guide for the construction, operation, repair and principles of wireless receivers. Over 220,000 copies sold. Definitions, explanations, formulas, etc., rapidly consulted. 12/6 (post 6d.)

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By P. H. Brans. More than 10,000 tubes listed, the only book of its kind in the world. Contains, in twelve languages, characteristic tube data of U.S., British, French, Czech, Swiss, Australian, Scandinavian, German, Italian, Russian, Japanese, and all other available types. "Here at last is the Radio Tube Handbook which radio engineers have dreamed of," says "Electronics." 424 pages. 27/- (post 10d.)

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New edition of the original "Jones' Radio Handbook." Latest information on dozens of wartime developments, F.M., U.H.F., Tube design, etc. 512 pages, hundreds of diagrams. 24/- (post 1/-.)

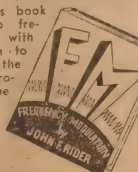
11. A New John Rider Book! 'INSIDE THE VACUUM TUBE'

By John F. Rider. A complete easy-to-understand explanation of vacuum tube fundamentals especially written for the man who wants to know how Vacuum tubes function. 424 pages, hundreds of diagrams—just out. 36/- (post 10d.)



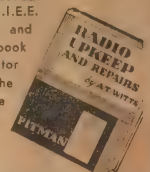
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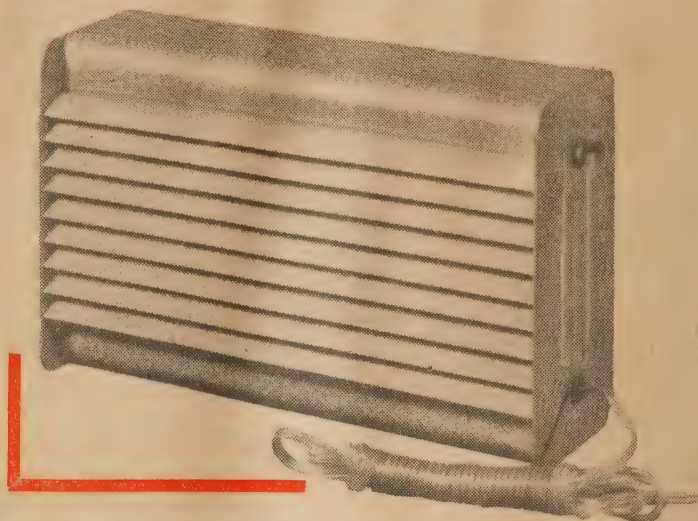
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(Tech. R.H. 7/48)

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Install
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With a Kingsley Extension Speaker you can settle in your favourite nook and really enjoy listening **IN ANY ROOM IN THE HOUSE.**

It's just the idea for the Test broadcasts. The Kingsley Extension Speaker illustrated above, is a dependable compact unit housed in an attractively finished modern metal cabinet. The unit employs a Kingsley six-inch permag speaker—type KR6. An "off-on" switch is located on the cabinet. Installation is simple. Full directions accompany each unit. RETAIL PRICE, £2/18/6. Ask your radio dealer or write for details of the K.R. Extension speaker.



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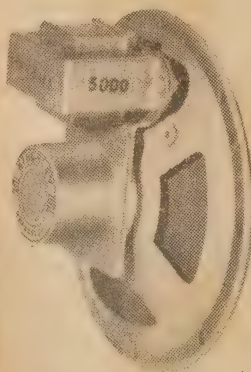
The KR5 Speaker is the latest addition to the already famous range of Kingsley Radio Speakers.

Illustrated at left—This Kingsley Speaker has new and improved seamless cone. Imported British magnet, featuring "Alcomax 2"—the highest grade magnetic alloy made. Cadmium plated housing. Standard mounting. Full size matching transformer.

Available any desired impedance.
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ditions favorable for 90 per cent. of working hours, to effect 15 changes of air per hour in a suitably designed building, without artificial aids. The booklet is of greatest value to anyone, including radio men, who are contemplating a new factory.

Watch for detonators!

SENATOR ARMSTRONG has announced that there are good grounds for the belief that a number of radar sets which possibly contain detonators have been stolen and may have come into the hands of radio dealers or the general public through unauthorised channels. These sets were not the property of the Commonwealth, nor were they under the control of the Commonwealth at the time they disappeared.

Senator Armstrong further pointed out that similar sets had been sold by the Disposals Commission, but before they were notified as available for sale the strictest precautions were taken by the Service Departments concerned to ensure that the detonators had been removed and the sets rendered harmless.

Any firm or persons who may have acquired any of the sets of the type described and have any doubt whether they have been rendered harmless are warned of the danger of attempting to experiment or dismantle them and to report the matter to the nearest Service Department Headquarters or establishment or to the police, when action will be taken to have the set examined.

The size of the radio receiver, which is of the IFF type, is 13in. high by 12in. broad and 9in. deep, weight approx. 30lb., and it has either a black crackle finish or a plain grey.

The receiver is built in two decks, the upper one containing the receiver and the lower the genemotor power supply. The upper deck has a receptacle and metal bracket on the front of the receiver for the detonator.

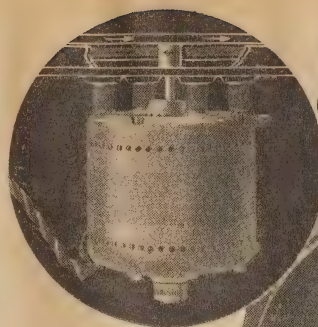
One type of detonator is cylindrical with a two-pin plug mounted in bakelite.

The second type of detonator is mounted on a heavy rectangular metal plate with a two-pin plug mounted on a small strip in front of the plate. In both types the plug is visible behind the metal bracket when the detonator is fitted to the receiver.

If any voltage is applied to the detonator plug, the detonator will explode.

Purchasers are assured there is no risk whatever associated with other types of Service radio sets.

Mankind has always appreciated frozen foods. Alexander the Great favored iced drinks, and Nero used to send slaves to the mountains for snow and ice to cool his fruit salads. Marco Polo discovered water ices during his travels in Asia. In the 14th century an Italian architect named Buontalenti made a fortune by manufacturing frozen desserts.



"BRS"

Smooth, silent RECORDING



R12 RECORDER & PLAYBACK UNIT

Smooth, silent recording can only be achieved by reducing to a minimum the variable factors which contribute to noise. Amongst these — one of the foremost — is rumble produced by the turntable motor and its driving connection to the turntable.

The 1/60 H.P. edge-drive synchronous motor that operates the R12 Recorder & Playback Unit is machined to the highest order of precision and is cushioned on special rubber bonded suspensions. This completely eliminates transmission to the frame of such motor vibration as may exist. A moulded rubber drive-ring —

on the outer rim of the turntable — of correct durometer hardness, engaging with a machined brass pulley directly on the motor shaft, absorbs any further vibration and ensures free, even running.

Designed for installation in any standard radiogram or for use with most types of receivers, the R12 is simple to connect and operate. A precision made sound instrument for recording and immediate playback, it is comparable to similar higher priced equipments. Recording blanks of commercial quality and moderately priced are available in any quantity.

USE THE R12 IN YOUR RADIOGRAM

Here is an opportunity for the enterprising hobbyist to do sound recording in his own home. Used intelligently, a great deal of pleasure can be derived from this unit at little cost and, once the operator is proficient in its use, it may be turned into a profitable side-line by making records, for friends and others who may be vocalists or instrumentalists.

OTHER "BRS" PRODUCTS

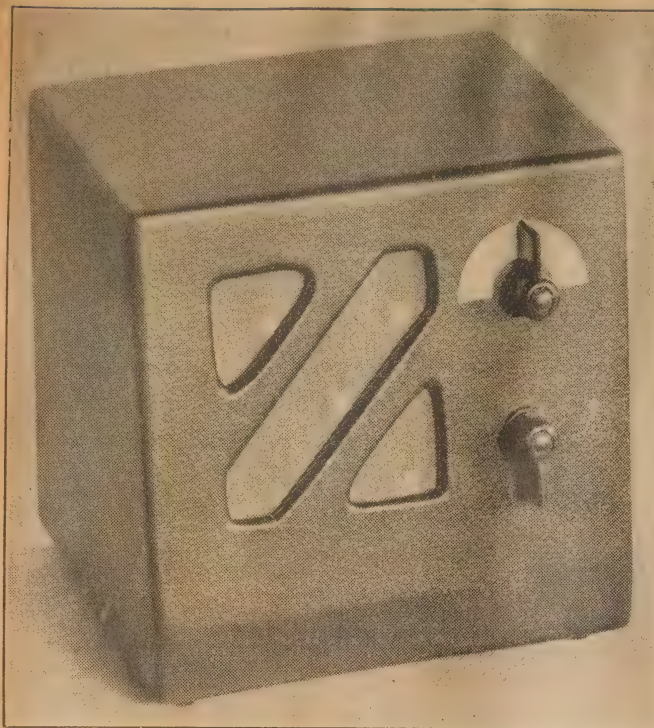
- Acetate Recording Discs — 8, 10, 12 and 16 inches.
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Each unit is housed in a neat little case fitted with rubber feet to obviate scratching your desk. Any preferred finish will do.

number of remote points. Though sufficient for special cases, such systems do not meet the majority of requirements. It is highly desirable for each station to be able to call and converse individually with any other station.

If four or more stations are involved, two or more conversations should be possible at the one time. This requirement obviates the possibility of a single central amplifier.

Another point which renders a single amplifier impracticable is the requirement for secrecy. It should be impossible for anyone to "eavesdrop" on a conversation in another office by switching in his own intercomm. unit.

CALL SYSTEM

A serious problem is presented by the necessity for calling up a particular station. It is best accomplished by an audible rather than a visual system, and must operate irrespective of the selector switch setting at the called station. The station called must also be able to identify the caller so as to establish immediate contact.

In a simple system, banks of relays, jack switches, and indicators, cannot be specified, and contact must be established and maintained by nothing more complicated than a couple

A SIMPLE INTERCOM. SYSTEM

An "inter-com." system in the office will avoid time-wasting visits and intrusions over small matters. It makes possible a close liaison in the factory between executives and production heads. You can even find good use for an intercomm. in the home between workshop, kitchen and nursery.

THERE is no need, of course, for us to "sell" the idea to readers, as most big firms already make full use of Office Inter-Communication Systems. The special point about this article is that, for the first time, we tell our readers how to build and operate a full-scale installation.

In so doing, we feel that we have unearthed quite a few points of special technical interest.

MANY POSSIBILITIES

Having decided to go into the matter of intercomm. systems, we looked up all references to it in our technical files in search of bright ideas. It became obvious immediately that there are dozens of possible arrangements, all having their particular advantages and limitations. In case you have not had occasion to give the

matter much thought, here are some of the factors to be considered:—

If a system is to be really useful and versatile, it must be capable of providing for a multiplicity of "stations," in practice, anything from about two to about 12.

It should be possible to add or remove stations, or to otherwise modify the set-up without unduly disrupting the operation of the system.

Some systems allow traffic only between a single "master" station and a

of standard switches. This is not an easy one!

Simplicity of construction and design is desirable but, above all, the units must be simple to operate. Complicated switching procedures will discourage the non-technical user, and the whole purpose of the system will be defeated.

Two-way operation is undoubtedly the most convenient, but it involves a separate microphone and speaker at each station, increases wiring requirements, and introduces feedback problems. The alternative is to use the "press-to-talk" principle, and make the loud-speaker serve also as a microphone.

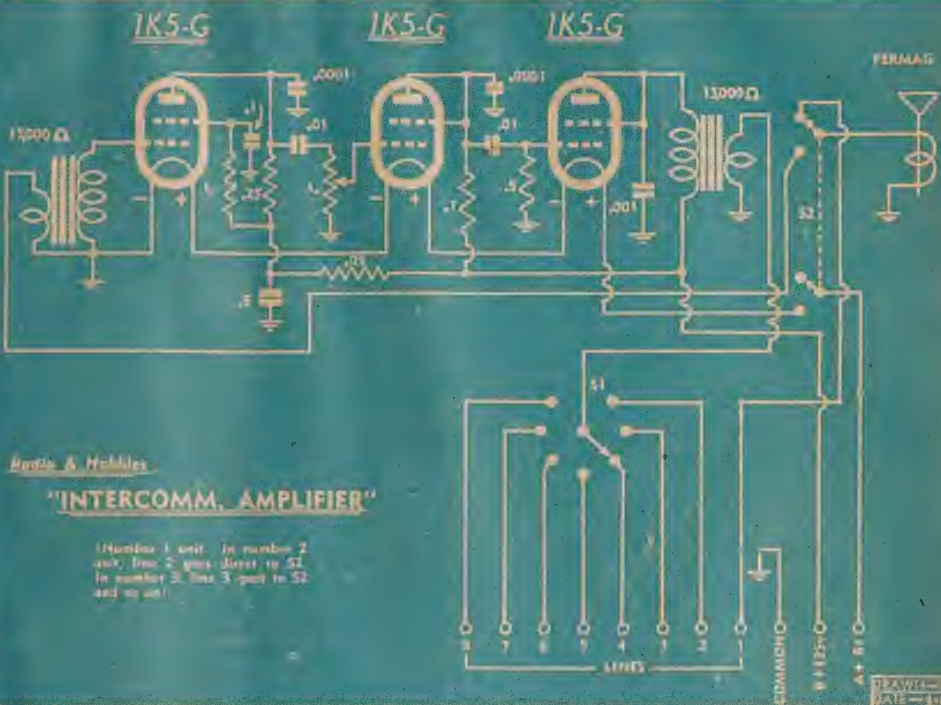
WIRING TROUBLES

Complexity of wiring between stations is of paramount importance. A large number of wires is inevitable in any versatile multi-station system, but attention must be given to keeping the wiring complexity to an absolute minimum.

All this adds up to a rather formidable list of requirements, and by

by **W. N.
Williams**

CIRCUIT DIAGRAM OF THE INTER-COM. SYSTEM



the time we had devised a workable system, there was an impressive array of tentative circuits on the table. The chief difficulty, of course, is in the arrangement of the lines and switches. One works out a masterly system, only to find that there is no way of calling a station without everyone else being aware of it. Or perhaps the whole set-up is rendered unworkable by an unforeseen complication of the multiple switching.

In fact, the design of an intercomm. system affords most excellent practice for "nutting out" electrical circuits. You will probably share our experience of finding that an excellent scheme for two or three stations becomes hopeless when an effort is made to cover upwards of half a dozen.

In our own design we began with the assumption that each station must be able to converse with any other station at will and that two or more simultaneous conversations must be possible over the system. These two requirements, carried into practice without relay systems, necessitate the provision of a small amplifier at each station rather than a more comprehensive central installation. In the accepted terminology, each station must operate as a "master."

FEEDBACK

To avoid feedback problems and in the interests of simplicity it was further decided to provide for push-to-talk operation using the speaker

The circuit is essentially simple—just a straightforward resistance coupled amplifier. The valves are particularly cheap to buy and are operative only when the operator is talking. The cables may be separate leads, or you may use multi-wire cable. The actual number of connecting wires depends upon the number of units involved.

also as a microphone in the "talk" position.

These two decisions are fundamental and the chief remaining point is to select the type of amplifier and the source of power.

BATTERY VALVES

Though some may differ from us in this view we feel that it is wasteful of power and equipment to have all valves in an intercomm. system permanently on, even if only in respect to the heaters. Even allowing for fairly frequent use, the actual proportion of time that an intercomm. unit is actually operating, related to a full working day, is quite small. And it is clearly impractical to wait for a-c valve heaters to come up to temperature before replying to a call.

The answer to this problem is provided by the use of battery valves, which are ready to operate immediately the switch is closed. The valves therefore do not operate or consume current except when the particular unit is in use.

The first experimental amplifier

used a couple of the new buttbased miniature valves of the IT-3V4 series. With a modern 3in. or 5 loudspeaker there was sufficient audio power but not quite enough gain for general use. By very careful design of the amplifier and choice of transformers and lines, operation would have been possible in a quiet building, but there was clearly a reserve of gain to cater for other than optimum conditions.

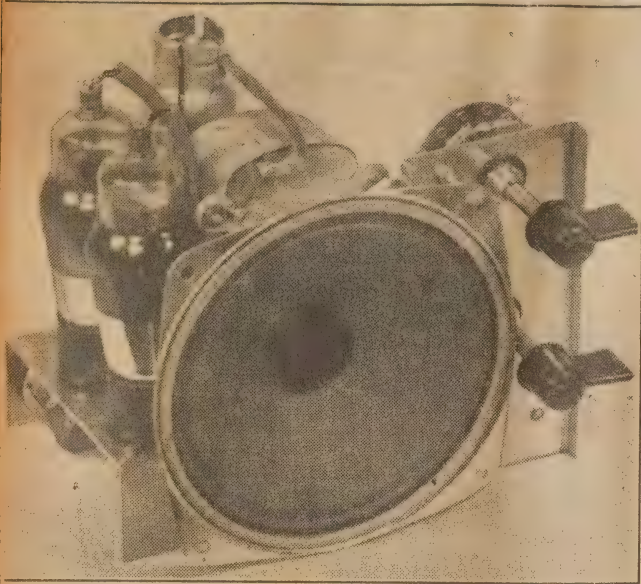
A three-stage amplifier using miniature valves could be made very compact and efficient, but the cost of building and installing a multiplicity of stations, each with three of the valves, would have been higher than desired.

THE IK5-G

Casting around for other types, a mind went to the 1K5-G, an excellent 2.0 volt pentode which was produced by tens of thousands for military use. Valve companies hold huge stocks of these valves, and one substantial cut in price has already been made to encourage their use. They are much larger than the miniature, but so reliable and robust that valve replacement problems should be virtually nil.

With this thought in mind we make a further approach to the "power that be" and the result was a further substantial cut in price. By the time you read this you should be able to purchase 1K5-G valves for little more than half the price of the miniature

FRONT VIEW OF THE CHASSIS



A picture of the unit from the valve end. Complete shielding of valves does not seem necessary, but care should be taken to isolate as much as possible input and output circuits.

Subsequent tests showed that ample gain and power was available from a three-stage 1K5-G amplifier. Using a 5in. speaker for, preference, a quality at operating level was completely natural and, even in a busy building, it was possible to carry on a satisfactory conversation with the units at each end at full m's length from the operator.

Now for the power source. There is an obvious objection to having a complete set of batteries at each station, since replacement at even small periods would involve fairly heavy expense. They would waste away rather than wear out. The obvious answer is to run an intercom wire to all stations carrying a voltage from 90 to 135 volts for the filament supply. The current drawn is so light that the leads would not introduce any troublesome effects, and the requirements of all units could therefore be met by a single set of batteries. The line could be adequately fused and protected to satisfy fire and safety requirements.

WIRE RETURN

The next step is an obvious one: why not operate the filaments in the same way? By connecting the filaments in series the requirements for each unit are 6.0 volts at 0.12 amp. A few minutes calculation with wire tables and Ohm's law showed that a central filament supply would likely be practicable, at least for all units not too remotely placed. The units will operate quite happily with substantially reduced filament voltages, besides which, a series-filament

valves connected as pentode-triode-triode, with all filaments in series. The filaments can be operated, as suggested, from a central 6-volt bank of cells. If the run is excessive, there is room in the cabinet for four 1.5 volt torch cells to provide a local supply. Better still, if one likes to be very "canny," a single extra torch cell can be clipped into the remote unit, in series with the filament line, to offset the voltage drop from the central supply.

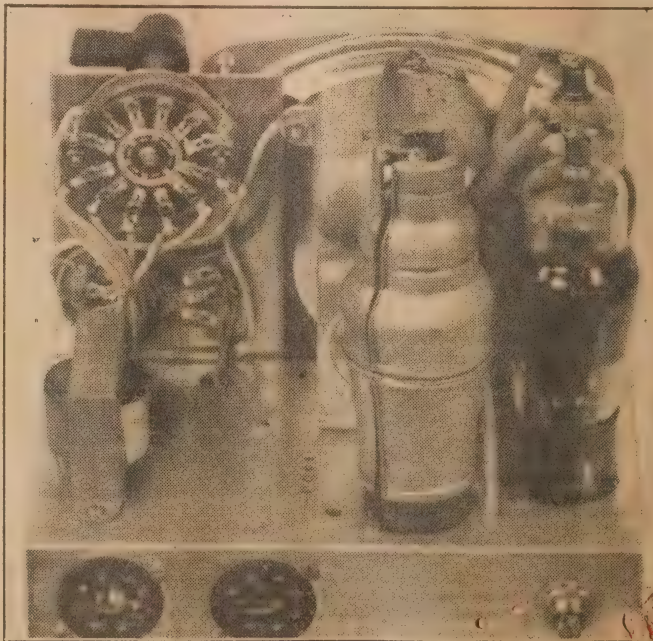
You may hesitate, at first, at the thought of running two extra supply lines, but the additional complication is very small. They may be just two extra lines in a dozen and the units can be connected to them in exactly the same way as to the normal audio lines.

INDIVIDUAL POWER

The alternative would be to have individual battery banks at each station, or a-c valves operating continuously and requiring permanent connection to a power point.

Apart from the switching, the amplifier design is quite straightforward and hardly calls for special comment. There is quite a lot of gain and, in the interests of stability, the first stage is decoupled and all plates have R.F. bypass condensers. It is necessary to shield the first valve, but shielding on the other two is optional and will be necessary only in special cases. Coupling condensers of .01 mfd. are specified but, in practice, it may prove desirable to reduce them to as low as .001 mfd. A lot depends on the details of the baffling and the exact tonal balance required.

Two transformers are necessary on each amplifier, one serving as the



Another view of the intercom. unit.

A selection of components that are difficult to secure except from PRICE'S RADIO

CYLDON Transmitting Condensers



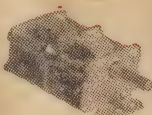
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PLESSEY Condensers



A high grade condenser with ceramic insulation. Capacity 385 mmF. Size **8/6**
2 1/2" x 2 1/4" x 1 1/4".
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SHORT WAVE 2 Gang Condensers



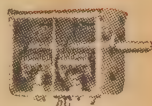
An efficient condenser for many special applications. Rotor mounted on ball bearing with earth wiper contacts. Ceramic insulation. Capacity 50 mmF. per section. Size 3" x 2" x 1 1/4". **12/6**
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WAVEMASTER Condensers



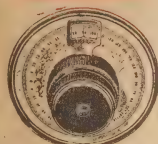
A rigid British condenser. All brass construction, with ceramic insulation. Capacity 100 mmF. Size 2" x 1 1/2" x 1 1/4". **8/6**
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A precision miniature for all small receivers. Capacity 385 mmF. Height 1 1/2", width 1 1/4" length 2 gang 2 1/2" 3 gang 3".
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TYPE C.

75mmF. Single spaced **7/6**
Postage 6d each extra.

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A double 200 mmF. Condenser at a reasonable price. Ideal for aerial tuning, etc. **10/-**
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VERNIER Ball Drives



A precision drive unit for 1" spindle. The ratio is 8 to 1. **7/6**
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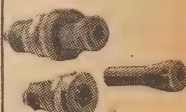
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British Sockets



Octal "Mazda" type for English 8-pin valves, such as VR65A. **1/-**
Postage 11d.

MINIATURE Connectors



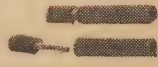
Polarised 2-pin chassis socket and plug. Ideal for speaker connection to small sets. **1/6**
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INSTRUMENT Knobs



Black Bakelite Knobs — 4 sizes of same pattern.
2" **1/8** 1 1/2" **1/6**
1 1/4" **1/3** 1" **1/-**
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Cord Connectors



Fully insulated single connector for aerial or earth leads—in red or black. **11d.**
Each **11d.**
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SCALES AND Nameplates



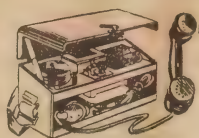
A type for most application — please write for full list.

PRICE'S RADIO

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(Don Mark V)

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59'6 EACH

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12 in. SPEAKERS 12 in.

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microphone input transformer, the other as the output transformer to speaker or to line. For stability, we found it preferable to use the speaker's own transformer for the input circuit, the voice coil leads being wired appropriately. Specify a 15,000 ohm transformer for maximum gain.

For the output transformer we used a small replacement type, which also had a nominal impedance rating of 15,000 ohms.

You may find that the phasing of the input transformer has a bearing on the stability of the amplifier and reversing the connections to the secondary may cure a tendency to instability.

SWITCHING

The switching is best considered simultaneously with the system of lines.

We checked through many different wiring methods before selecting the straightforward system ultimately adopted. Some are excellent in the degree of independence achieved, but introduce serious difficulties in calling a wanted station. Problems arise also in regard to adding extra stations to the system. Others are hopeless from the point of view of secrecy.

Another point is that a factory intercomm. system will normally be serviced by factory electricians, whose approach to the subject of wiring and circuits is quite different from that of radio or telephone engineers.

The system we suggest involves running a multi-core cable or a system of wires round the office building or factory by a route that will bring it past as many of the points to be served as possible.

The number of conductors required will be equal to the maximum anticipated number of stations plus the high tension, filament and earth returns, preferably one for each station. But more of this point anon.

In practice, the cable would be opened at a point adjacent to each anticipated station and the individual wires made available on terminal strip. The individual units can be connected directly to this strip or, if necessary, by means of an extra length of cable.

TERMINAL BLOCKS

The exact route of the wiring is unimportant, provided the connections are not confused. In practice, it is wise to number the terminal points, making each top lug, say, No. 1, and the others in order beneath it. The wiring must be arranged to join all Nos. 1 together, all Nos. 2, all Nos. 3, and so on.

In altering or extending the system at a later date, it is only necessary to maintain the electrical continuity of No. 1 line and its contacts, and so on. If additional stations are required, extra lines are run in parallel with the existing ones, and extra terminal lugs installed. This is a straightforward wiring job, and will not

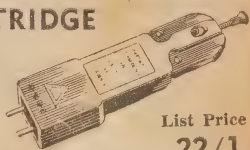
ACOS stands for technical perfection



A modern, crystal pick-up housing the G.P.9 cartridge in a smart, moulded bakelite arm. Needle pressure can be adjusted by novel beryllium copper spring in the base and bracket assembly to user's preference. Normal pressure is only 14oz. Other features include 95 degree lift-back for needle changing. Vibration-free arm movement.

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The G.P.9 is unique amongst crystal cartridges in that it is virtually impossible to break the crystal contained therein. Other advantages include freedom from effects of humidity, low record wear, resonance-free reproduction.



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... housing a unique assembly, making the crystal virtually UNBREAKABLE!

The motion of the stylus is passed to the crystal via a flexible coupling. This means that, whilst the lateral movements caused by the record grooves are effectively transferred, the flexible coupling "A" absorbs sudden vertical movements caused when pick-up is dropped on record—thus protecting the crystal "B"—making it virtually unbreakable.



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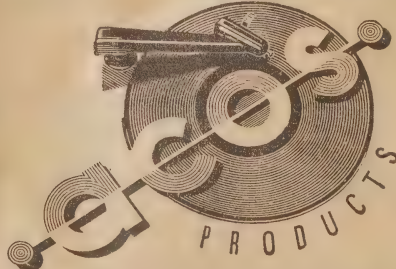
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Something new in listening — a personal speaker that fits snugly under your pillow; provides personal listening to favourite programmes — without disturbing others. Tone quality compares favourably with cone-type speakers. Lightweight BIMORPH crystal drive ensures uniform response—high sensitivity. Attractively styled in plastic case with chrome finish. For use with any radio or sound system.

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MULTI-TALKIE

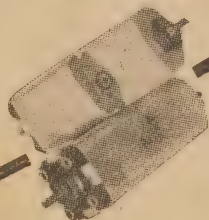
THIS specially designed Midget Oscillator
Coil is wound on $\frac{1}{4}$ Watt I.R.C. 100,000
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with the I.R.5

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A "High Q Factor" Loop Aerial
with free loading coil.

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These "Tiniest" IF's have full size performance,
yet are the smallest in Australia.

Available in both No. 1 and No. 2 **13/9 each.**

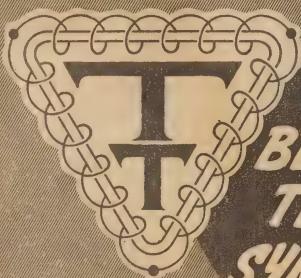
"Q Plus" Recessed Knobs prevent de-
tuning when carrying and are the ideal
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Every transformer looks to be
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but the beauty of Trimax Trans-
formers is more than skin deep!

Long experience and high stan-
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that the unseen parts of your

Trimax Transformer will prove
their reliability in every test.

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ENQUIRE FROM YOUR NEAREST SUPPLIER.

puzzle any electrical worker. Furthermore, the system is not rendered inoperative while the job is in progress.

While on the subject of wiring, the matter of inter-modulation warrants special mention. In many systems, it is found that crosstalk occurs, one conversation being heard as a background to another. The effect is related to the impedance at which the lines operate, the length of the runs, the nature of the amplifier and wiring circuits, and the nature and spacing of the conductors. The power at which the whole system operates is another relevant factor.

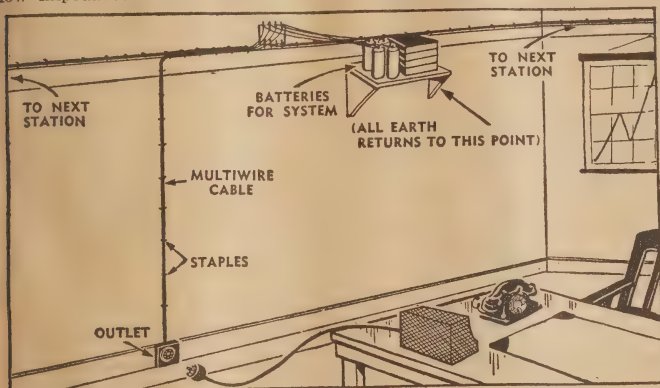
In our case, the lines carry only the speaker operating power at voice coil impedance. There is no gain between the line and speaker, and the very low impedance makes crosstalk un-

easy connection is made to the permanent wiring by means of an octal and another socket of different type.

The incoming lines are connected with one exception to the respective terminals of the rotary switch, the common arm being connected to the amplifier output circuit.

The amplifier units are identical at all stations, except for one important point. This can best be explained by reference to the circuit, which, for purposes of reference, has been branded "No. 1 Amplifier." This amplifier will be labelled "No. 1" in the system and is so connected that No. 1 line goes to the speaker voice coil without reference to the rotary selector switch.

Thus No. 1 operator must be called on No. 1 line. He can listen only to speech directed to him via that



This diagram shows how the units could be placed in a typical system.

likely by ordinary capacitive or magnetic effects.

The chief danger then lies in the earth return circuit, which can represent an impedance common to voice coils and power supply. Energy can be transferred from one voice coil to another or injected into the filament circuit of any other amplifier which happens to be operating.

SEPARATE EARTH RETURNS

In practice, it is unwise to rely on a common earth return wire for either or both reasons. Select the most convenient central point and run all earth returns back to it exclusively. The batteries should also be located at the same point. If this precaution is not taken, some degree of cross-talk is almost inevitable.

It is wise, by the way, to connect a couple of 4 mfd. paper condensers across the B-batteries to keep the impedance of the high tension circuit down as the batteries age.

Each station is given a number, and, for purposes of reference, a card will be necessary giving the list of persons accessible on the system and the number to call.

Reverting to the amplifier circuit, you will note that each amplifier is provided with a rotary switch and a couple of sockets which direct the output of the unit to any individual line. Ordinary wafer-switches will handle up to 12 or 13 lines, while

line, and no other station can tap the conversation. By the same token, No. 1 can listen on no other line, though he can address any other selected station by way of the rotary switch.

In No. 1 unit, the selector switch positions would not include No. 1, being numbered as necessary from 2 to 12.

In No. 2 unit, No. 2 line would connect through the "press-to-talk" switch to the voice coil, all other lines being connected to the selector switch. Thus, No. 2 position would be omitted.

In just the same way, No. 3 unit would use No. 3 line for listening, all other lines being connected to the selector switch for outgoing speech. In other words, each station has its own individual listening line and can be called by the simple procedure of addressing the station via that particular line.

The second switch on each amplifier gives "press-to-talk" operation. It must be a double-pole double-throw type and should be spring-loaded to maintain normally the "listen" position. A telephone type key switch will serve the purpose or a type of press-button switch which was used in some military equipment. A difficulty about this latter type, however, is that the cabinet may have to be anchored to the table — for obvious reasons!

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CRISP, CLEAR-CUT SPEECH.

Striking Appearance.

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No Boom or Puff.

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PICK-UPS ETC.



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University Meters, as illustrated above, 0-1 Milliammeter type F3, £2/12/6 nett; plus sales tax. Full range all types carried in stock. Special requirements to order.



● "Rola" Permag loudspeakers now available for Kit Set builders.

* Less discount to Amateurs and Trade, plus tax.

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208 LT. LONSDALE ST. MELBOURNE *Phone CENT. 418*

The switch used in our own amplifier is a special spring-loaded wafer type, which can be obtained on order by your radio supplier. It is a standard line in at least one popular brand.

Now to trace the sequence of operation. If No. 5 wishes to call No. 2, he (or she) sets the selector to No. 2 line, presses the "talk" switch and says "No. 5 calling Mr. Smith," or "Miss Jones calling Mr. Smith," or "Mary calling Bill" — depending on office discipline!

The operation of pressing the "talk" switch couples the speaker voice coil to the amplifier input transformer, connects the output transformer to line and switches on the filaments. The caller's voice is, therefore, amplified and the signal impressed, through the selector switch to No. 2 line.

This line is normally connected to the speaker voice coil in the No. 2 unit, so that the call is reproduced in "Mr. Smith's" office. That gentleman turns his selector switch to No. 5 position, presses the "talk" key, and acknowledges the call.

PARTS LIST FOR THE INTERCOMM AMPLIFIER

- 1 Chassis $6\frac{1}{2}$ " x $3\frac{1}{2}$ " x $1\frac{1}{2}$ ".
- 1 Bracket for mounting switches.
- 1 5" permag. speaker.
- 2 Speaker transformers (15,000 ohm)
- 3 Valves type 1K5-G.
- 1 1 x 12 Rotary switch.
- 1 2 x 2 Rotary switch (with spring return).
- 1 1 meg. potentiometer.
- 4 Octal sockets.
- 1 4 pin socket.

RESISTORS

- 1 1 meg.
- 1 .5 meg.
- 1 .25 meg.
- 1 .1 meg.

CONDENSERS

- 1 .5 mfd.
- 1 .1 mfd.
- 2 .01 mfd.
- 1 .001 mfd.
- 2 .0001 mfd.

SUNDRIES

Hook-up wire, shielded wire, spaghetti, busbar, goat shield, nuts and bolts, solder lugs, grid clips, knobs, etc.

ADDITIONAL FOR WIRING CIRCUIT

1 octal socket and 2 octal plugs per station; connecting cable (2 wires plus 1 additional wire for each station in the system); earth wire (stranded copper) 3 45 volt "B" batteries; 6 volt "A" battery or 4 1.5 volt cells; staples.

If, perchance, Mr. Smith is already engaged in conversation, and is listening, the new call is heard over the conversation, and, at first opportunity, he turns his selector switch and advises the new number that he will call back later. If Mr. Smith is already speaking, the new call is not heard, and there is no acknowledgment.

The mechanical details of the amplifier are built to suit individual requirements, although the suggested

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operates from 240 A.C. Capacity 6 large cups. Chrome Finish.

£5/4/7

Autolex Automatic ELECTRIC TOASTERS.

Toasts two slices at once and ejects them when toasted.



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Model 242 with bakelite housing and pulley drive, 10/9 each.

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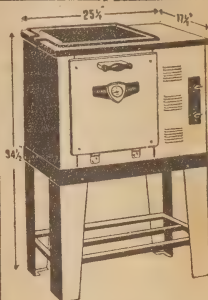
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Full instructions all parts including batteries, valves, and speaker.

£16/19/6.



OXFORD COOKER.

Plugs in to standard 3-pin socket as illustrated.

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Metal case in assorted colors.

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ICE CUBE TRAYS.

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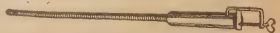
Dimensions $10\frac{1}{2}$ " x $5\frac{1}{2}$ " x $1\frac{1}{2}$ ".
Makes 28 cubes.



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1½ and 3 gallon capacities from

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Simple to install and operate. Work exactly the same as PMG phones from house to house, house to shed, etc.

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Ideal for Battery Charging or Model Train enthusiasts.

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Brand New American Wood Augers

Size 3-16" only.

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Brand New Carpenters Dividers

Will also suit hobbyists.

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Ideal for caravans and boats. Usually £28/-.

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Round Nose Wire Bending Pliers

Never before available at this Price

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Will check above and below zero. Absolutely new and complete.

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Time delay relay. With variable time delay control.

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Army Rulers 12" 2/- each

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Brand new will suit draftsmen, students, etc.

Brand New "Salter" Spring Balances

Will weigh to 30lb.

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BRAND NEW AMERICAN STARRET FILLET or RADIUS GAUGE

Radius 1-32" to 1/4" in 1-64ths.

Fillet 3-64" to 1/2" in 1-64ths.

Usually 15/- Both, Gauge

Price 15/-

design should be fairly representative. The chassis measures 6 $\frac{1}{2}$ in. x 3 $\frac{1}{2}$ in. x 1 $\frac{1}{2}$ in., and can be made of either steel or aluminium.

The exact mounting arrangement for the speaker will vary with the type selected, but the one used in the original unit is bolted directly in place, with the cone housing protruding approximately one inch in front of the chassis.

The input transformer mounts on the chassis, just behind and to one side of the speaker, with the first voltage amplifier valve alongside it. The second valve mounts in the corner, with the output stage to the front, alongside the loudspeaker.

GAIN CONTROL

Some adjustment is desirable over the gain, to prevent overloading, if the operator is "blessed" with a loud voice. The gain control is mounted on the rear of the chassis and the shaft arranged for screwdriver adjustment only.

The two selector switches are mounted on a vertical bracket, measuring 5in. x 2 $\frac{1}{2}$ in., with a $\frac{1}{4}$ in. flange at either edge to give rigidity. The rotary selector switch is best located at the top, with the "press-to-talk" switch below it. Other details of the construction are evident from the photographs.

Such, then, is the story of the first "Radio and Hobbies" Intercom. unit.

ABOUT AERIALS

A RECENT issue of Wireless World carries a lengthy article by M. G. Scroggy on aerials for broadcast reception. For the most part it is a detailed technical analysis on effects which we are already vaguely aware of. Certain points are made, however, which will bear repetition:

(1) Man-made noise is generally confined to the immediate vicinity of electrical wiring so that the signal-to-noise ratio in bad locations is normally improved by erecting the aerial as high as possible and in the clear. If the feed line to the receiver can be made insensitive to signal pick-up, so much the better.

(2) It is impossible to design an aerial coil which will give optimum results with any type of aerial connected to the primary. A compromise is generally effected which means that a small aerial will be inefficiently coupled, while a large one will be overcoupled tending to produce effects of unselectivity and cross-modulation. At least two aerial terminals should be provided, one for a long and one for a short antenna.

(3) It is better to use a long aerial with a small degree of coupling than a short aerial intimately coupled to the tuned circuit.

(4) A much better signal transfer is obtained by inductive coupling than by coupling the aerial to the "hot" end of the tuned circuit through a series capacitance. A limiting factor in the latter arrangement is capacitance transferred to the tuned-circuit by the coupling.

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WITH
**SMOKE
ABATEMENT?**



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The photo electric cells located in the works' chimneys are protected by IRC Resistors.

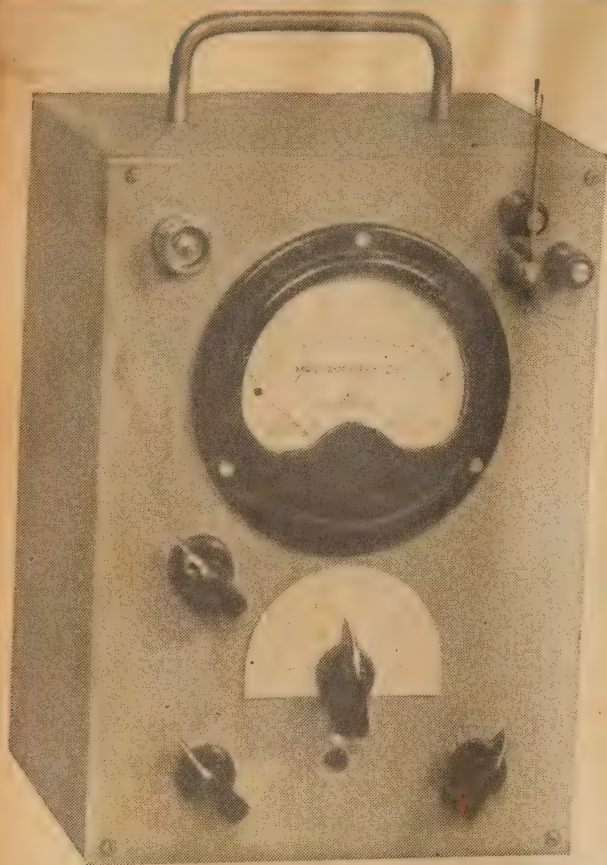
The ingenious contrivances not only record the density of smoke passing through the stacks [thereby checking a nuisance], but they assist in fuel conservation.

In every way, in every phase of the electrical industry, IRC Resistors are saving, speeding, protecting, and providing greater efficiency to users' products.

There is a specific IRC Resistor for EVERY purpose—in all types and sizes of Metallized, Wire Wound and Volume Controls. It will be a pleasure to our IRC technicians to discuss and advise regarding any types of application.

IRC RESISTORS

Wm. J. McLELLAN & Co.
BRADBURY HOUSE, 55 YORK ST. SYDNEY. BX2508



The finished job is mounted in our standard size instrument case, but can be made smaller, particularly if you have a 2 or 3 inch meter. Indication is quite sharp, and calibration can be made quite accurately, particularly if you "bandspread" the coils by using a smaller tuning condenser.

vary the plate voltage. There is an obvious disadvantage in imposing too heavy a bleed current on the B battery, while a very high value of potentiometer tends to insert a large resistance in the plate circuit and thereby reduce the sensitivity of the meter.

A second disadvantage is that a "swamping" effect becomes evident with strong input signals, so that the plate current may decrease from one milliamp to about 0.4 milliamp in logarithmic fashion, and beyond this no further increase in input signal makes very much difference to plate current. Thus, little more than half the meter scale is useful in indicating actual field strength.

LINEAR OPERATION

The reason for this is partly that the valve is operating over the most curved portion of its dynamic characteristic. Also, in presence of a strong input signal, it tends to operate as a class C stage, and variations in signal level make relatively little difference to plate current. The combined effects are most noticeable with variable- μ valves, but even the sharp-cut-off types tend to "swamp" rather badly.

The only alternative is to arrange matters so that the meter operates on a more linear portion of the valve characteristic. This means that the maximum plate current may exceed one milliamp, and that the meter will not be expected to record below about

A FIELD STRENGTH INDICATOR

Experiments with transmitters and beam aeri- als are greatly facilitated if some form of field strength meter is available. The instrument described in this article involves no great outlay for parts and can be calibrated directly in terms of volts or decibels. Furthermore it will double as an excellent phone monitor.

ELD strength meters take a variety of forms, the simplest being sensitive microammeter in conjunction with a germanium type de. Unfortunately neither of se items is readily available in s country—at least without considerable outlay—and an instrument de up with a conventional milliammeter and crystal detector is a y poor substitute. Because of e factors, the meter described e uses a valve detector with a ventional milliammeter in the te circuit.

The original idea for this field ngth meter came from an Ad- ally design intended for use in

the region of 200 megcycles. This basic instrument was very elementary in character and simply consisted of an R.F. pentode wired as a leaky grid detector and a milliammeter measuring the plate current. With no signal input the milliammeter read approximately full scale, depending on the valve and the plate voltage, and the plate current decreased with signal.

There are several disadvantages with this elementary scheme, the chief one being that of calibration. It is essential at the outset, to adjust the meter to some reference point and this involves connecting a potentiometer across the B supply to

0.5 milliamp, where the "swamping" effect tends to be come evident. The use of a "bucking" circuit, therefore, becomes necessary, so arranged that the initial half milliamp or so is cancelled in its effect on the meter, the pointer reading only the change in plate current with signal.

Reference to the schematic circuit diagram will indicate how this result has been achieved.

Essentially the circuit imposes a 67½ volt battery directly in the plate circuit of a triode-connected 1K5-G. This particular type was chosen because it has very stable characteristics, sells for approximately the price of other types and exhibits

a very sharp cut-off when connected as a triode. Subsequent checks against other battery pentodes like the 1A4 and 1P5 showed an increase in sensitivity of several times in favor of the 1K5-G.

Allowing for normal variations, the plate current of a 1K5-G triode with 67½ volts on the plate and zero bias will fall between two and three milliamps. This, of course, would be sufficient to throw the pointer of a one milliamp movement hard over and ultimately cause it to be damaged. Obviously therefore an opposing current of the same order must be picked up from some other source and fed through the meter in reverse direction.

Reference to the circuit shows that the meter is connected at the negative end of the battery in such a polarity that the plate current of the 1K5-G tends to make it read in the reverse direction. To offset this, a variable amount of current is picked up through a resistance network from the filament battery and, by suitable adjustment, the meter can be made to read exactly zero.

BUCKING CIRCUIT

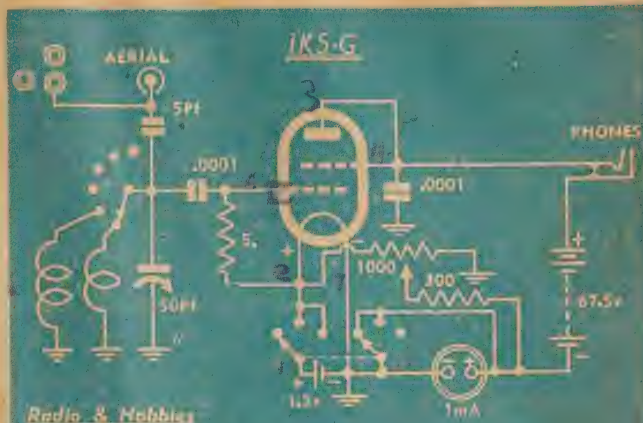
When an input signal is applied to the grid, the 1K5 plate current tends to fall, which means that the current from the filament circuit predominates, and the meter reads forward by a certain amount. The use of the particular "bucking" circuit therefore provides a zero adjustment, and simultaneously turns the meter into a forward-reading device, and simultaneously provides a zero adjustment, and simultaneously turns the meter into a forward-reading device. Furthermore since the meter now reads over a range of plate current from about 2.5 to 1.5 milliamps, the curved portion of the characteristic is avoided and the valve used in the region where its transconductance is highest.

For purposes of monitoring, a phone jack is inserted in the plate circuit, although it is immaterial whether it is connected at the positive or negative end of the high tension battery. With the phones in circuit it is possible to take the meter to a point remote from the transmitter, make various adjustments and keep the person operating the meter acquainted with just what is going on. He can thus record both the readings and the related experiments.

Now for a word about the switching and zero adjustment. If the "bucking" current is picked up from the positive filament pin, it is interrupted by the same switch which controls filament supply. However, closing the switch causes the "bucking" current to flow immediately through the meter so that the movement would normally be subjected to a violent impulse and overloaded for several seconds until the filament reaches operating temperature. This effect could be eliminated by backing off the zero adjustment each time the switch is operated, but it is a cumbersome method.

To avoid the need for this we have devised a double-pole three-posi-

CIRCUIT OF F.S. INDICATOR



FIELD STRENGTH METER AND PHONE MONITOR

The circuit is essentially simple, and can be wired almost in a matter of minutes.

tion switch which should not present any particular problem to an experimenter who has acquired any amount of disposals equipment. The first position of this switch is simply "off," which leaves the filament circuit open and the meter shorted. Turning the switch to the centre position applies voltage to the filament, but does not remove the short from the meter. The third position leaves the filament on and removes the meter short, so that it is able to read the resultant current. The technique is to rotate the switch slowly, giving the filament time to warm up before it reaches the operating position. This eliminates risk of damage to the meter and avoids the need for major resetting of the zero control.

The zero control by the way will normally be a wire-wound type so that the shaft must be insulated from the metal panel. Check the potentiometer with an ohmmeter before installation and make sure that it covers

the range fully from zero to one thousand ohms. The 300 ohm resistor is there purely to prevent the filament voltage being applied accidentally across the meter and, while some resistance is desirable here, the exact value can be varied if circuit conditions demand it.

1K5-G BEST VALVE

The 1K5-G is recommended as being the type most suitable for this instrument but it would be possible to construct it using other valves. As mentioned earlier the important point to watch is that the valves have a sharp cut-off characteristic and a relatively high transconductance.

The tuning system is conventional for a grid-leak detector and you please yourself whether you build for single band works or for multiple bands with plug-in coils switching. Switching appears to be the obvious choice, since only a single section is required and all coils be included permanently in the

PARTS LIST

- 1 Front panel 9" x 6½"
- 1 Metal instrument case 9" x 6½" x 5½" (or to suit).
- 1 0-1 mA meter.
- 1 1K5G valve.
- 1 50 pf. variable condenser.
- 1 5 pf. mica.
- 2 .0001 mfd. mica.
- 1 5 meg. resistor.
- 1 300 ohm resistor.
- 1 1000 ohm potentiometer, W.W.
- 3 Terminals.
- 1 Coaxial connector, panel mounting.
- 1 3 position, 2 section wafer switch.

- 1 Phone jack (shorting type).
- 1 1.5 volt battery.
- 1 67.5 volt battery.
- 4 Pointer knobs.
- 1 6 position, single section wafer switch.
- 1 Octal socket.

SUNDRIES

Hook-up wire, grid clip, nuts, bolts, solder lugs, range scale, carrying handle for case, approx. 5" ½ dia former, assorted wire gauges for winding of coils.

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Brand new test equipment—made by one of Australia's leading manufacturers—now offered at practically **HALF PRICE**

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For quick, accurate checking of condensers, resistors, and inductances—capacity range from 1 micro—Micro farad to 10 MFU—read direct on scale—resistance range from 1 ohm to 10meg, also read direct on scale—Percentage scale also incorporated—for comparative and rapid check between resistors—condensers, etc.—instrument can also be used on "open bridge" position—operates 220/260v AC, 50 cycles—finished in beautiful black brocade steel case, with cover—handle, etc.—11" x 7 1/2" x 6"—weighs 12lb. Originally priced, £20/0/0. "Hurry, 'Our Price" £10/5/4 (Write for details). (Freight extra)

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A high-class instrument—designed for laboratory—production work—radio servicing, etc.—inbuilt amplifiers with continuous variable gain control on both horizontal and vertical planes—linear time base, having frequency range, from 35 to 40,000 cps—adjustable in nine steps—with switching for coarse control—and a continuous variable control for fine adjustment—operates on 220/260v AC 50/60 cycles—uses (1) 902 (2) 6J7, (2) 5Y3, (1) 884—finished in black—crackle finish steel case—with carrying handle—metal hood and graduated scale for E.R. tube included—12" x 9 1/2" x 7 1/2"—weighs 20lb. Originally priced £37/10/-. Plus tax. "HURRY"—"OUR PRICE" £29/6/8 Brand new. Not ex-Disposals. Fully guaranteed. (Pamphlets forwarded on request.) (Freight Extra.)

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"MINIMINOR" 4-VALVE MIDGET AC KIT

A hi-gain super-het, uses all midget parts—EK32—EBF35—6V6—6X5—"Special" Midget 30MA P/trans, etc.—Kit includes beautiful cabinet £13/12/6 (Freight extra)

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Large purchase of manufacturers' discontinued lines allows the following sensational offers: A 5-valve portable personal foundation kit—uses (2) 1T4, (1) 1R5, (1) 1S5, (1) 1Q5—3" Rola—A special and assembly IP's, etc.—kit comes assembled—ready to wire—circuit and blue prints included—less valves, case and batteries—originally sold for £24/17/6. OUR PRICE £7/2/6 5-valve B/cast vibrator Chassis—complete—wired ready to use—less valves, spktr. and case—ideal for country use. OUR PRICE £13/10/- (Freight extra)

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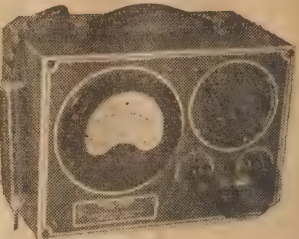
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| 1P5 | 22/4 |
| 1Q5 | 22/10 |
| 1R5 | 20/6 |
| 1S4 | 20/6 |
| 1S5 | 20/6 |
| 1T4 | 20/6 |
| 2N2 | 12/9 |
| 3A9 | 22/10 |
| 3Q5 | 22/10 |
| 3S4 | 20/6 |
| 3V4 | 20/6 |
| 3R4 | 21/6 |
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| 6J6 | 28/- |
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Kit includes all parts—ready to wire—plus easy to follow **£10/17/6** instructions

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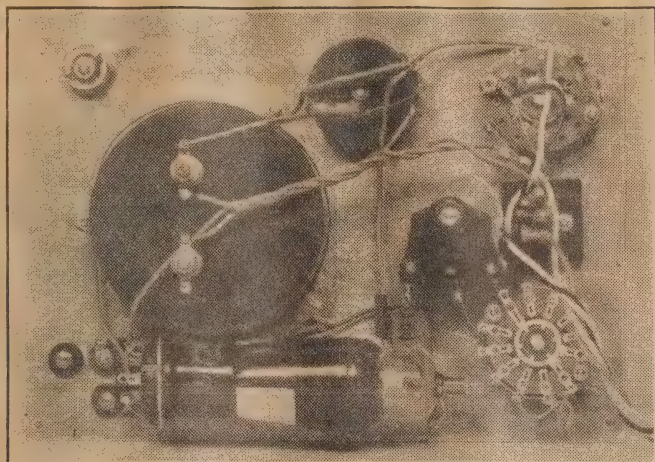
Space does not permit our advertising the varied and large stock of electrical and radio components we have to offer—we would therefore suggest you communicate with us for quotes on your requirements—all enquiries answered promptly—free technical service—our slogan: "Everything in the Radio and Electronic World"—"If it's available, we can supply it!"— "FN for FM and AM."

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UNDER CHASSIS OF F.S. METER



Easily recognisable are the two switches at the left, the variable resistor, valve and socket, terminals and co-axial plug, etc. The layout is not critical.

strument. The important point to watch is that a favorable L/C ratio is preserved at all times, since this has a direct bearing on the sensitivity of the instrument.

With this latter factor in mind, our design calls for a 50 Pf tuning condenser and 6 coils to cover the complete range from 3 to 60 megacycles. Coil data is given on this basis, but there is no special reason, if you so desire, why a 100 Pf condenser should not be used and the coils arranged to cover the spectrum in 4 bands beginning at say 5, 10, 20, and 40 metres. Apart from 80 metres the amateur bands would all be covered with the condenser in the low-C position.

The input signal is coupled to the tuned circuit through a 5 Pf condenser so that the calibration is affected to a minor degree by the actual aerial employed. This is not important, however, as the meter is not intended for use as a precision frequency indicator. On the other hand, it will be sufficiently accurate at all times to indicate the order of individual harmonics, and, by a listening test, to indicate their hum or modulation content.

Physically the instrument should be built into a completely enclosed metal box, large enough to house the batteries. This precaution will ensure that the signal is picked up only by the aerial, so that the amount of signal input can be controlled very simply by varying its length.

INSTRUMENT BOX

Individual constructors may have odd metal boxes available for the job, but our own instrument was built in a crackle finished case, measuring 9in. x 6½in. x 5½in. This is a trifle larger than strictly necessary, but we have in mind to adopt a standard type of instrument case, and this will probably be the ultimate size. No chassis, as such, is required, all components being mounted directly on the aluminium front panel.

The meter will be recognised as an ex-disposals 1-milliamp movement, which lends itself particularly to the purpose, since it has a blank scale ready for hand calibration. However, any other 0-1 milliammeter can be used, the panel cut-out being arranged to suit.

(Continued on page 79)

COIL DATA

| Band | Frequency | Turns | Inside Diameter | Winding Length | SWG |
|------|-----------|-------|-----------------|------------------|-----|
| A | 60—41 | 7 | $\frac{3}{8}$ " | $\frac{7}{8}$ " | 16" |
| B | 45—25.5 | 11 | $\frac{3}{8}$ " | $\frac{1}{16}$ " | 18" |
| C | 26.5—15 | 14 | $\frac{1}{2}$ " | $\frac{1}{2}$ " | 24" |
| D | 15.5—8.5 | 26 | $\frac{1}{2}$ " | $\frac{3}{8}$ " | 24 |
| E | 9.0—5.0 | 53 | $\frac{1}{2}$ " | 15/16" | 26 |
| F | 5.0—3.0 | 80 | $\frac{1}{2}$ " | $\frac{1}{2}$ " | 34 |

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Reliable make.

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Heavy Duty 20 Watt Wire Wound

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.1 and .5 mfd.

BLOCK CONDENSERS

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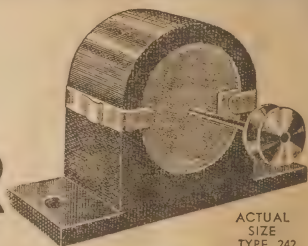
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ACTUAL
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TYPE 242

This amazing new ELECTROTOR Power Unit is without a doubt a PHENOMENON of advanced electrodynamics. Never before has anything like it been visualised. It occupies less space than a cubic inch, weighs only three-quarters of an ounce, yet it is a completely self-contained and fully operating power unit requiring only 3, 4½, or 6 volts to drive it. Furthermore, it consumes less than a flash lamp bulb (0.25 amps) and develops approximately 5000 revolutions per minute. It is instantaneously reversible. To the mechanically minded, the keen manufacturer or model-maker, the ELECTROTOR opens up completely new fields. ELECTROTORS have a thousand uses for powering toys, pocket fans, car-windscreen de-misters, razors, hair clippers, revolving window display units, display card movements etc.

Available from all Stores, Newsagents, Toy and Hobby Shops etc., and from Leading Wholesale Merchants.



ACTUAL
SIZE
TYPE 240

TYPE 240

Size 9-16" wide x 7-8" diameter.
Suitable 3, 4½ or 6 Volts. Speed 5,000
R.P.M. Consumption 0.25 amps.
weight ¾ oz., instantly reversible,
complete with pulley.
Retail Price - - - 8/6 each.

TYPE 242

Specifications identical with type 240
except that this model is in a neat
and compact plastic housing, with two
spring clip terminals and pulley drive.
The whole unit occupies less than two
cubic inches.

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FROM THE SERVICEMAN WHO TELLS

Just as I had expected my little story about the mouse a couple of months back was by no means unique. To judge by the letters passed on from the Editor, there must be a strange affinity between rodents and radio chassis, especially in the wheat belt. "Mice going, boys."

BY way of example, Mr. H. M. Turner, of Lockhart, NSW, tells the following story:

"A dual-wave battery set of pre-war vintage came in with the complaint of no reception whatever.

"On connecting up and switching on, the set was absolutely dead on broadcast but worked OK on short-wave. By simple deduction, the trouble was obviously in the converter or RF stage.

"I connected the signal generator to aerial and earth and, with the signal tracer, followed the signal through the RF stage to converter grid, and thence to the converter plate, where the signal was not as strong as it should have been. The oscillator circuit seemed to be the trouble.

"I had previously noted that our friends Mickey and Minnie had been playing hide-and-seek around the chassis, and particularly through the dial cut-out. The dual-wave switch in this model was in a handy position to the cut-out and served as a stepping stone from the top of the chassis to the innards. The trimmers, by the way, were mounted atop the dual-wave switch.

UNFORTUNATE SWITCH

"Ultimately, I found that the mice (perhaps for the want of somewhere else to go) had subjected the switch and trimmers to considerable indignity. The oscillator trimmer was virtually shorted by verdigris. Dismantling, wiping clean and thoroughly drying the mica and the trimmer plates restored the set to normal operation."

In another case, according to Mr. Turner, the same treatment had rendered a set of trimmers sensitive to humidity, so that the receiver performed badly in wet weather, but was quite OK when the air was hot and dry.

A rather more spectacular story comes from a Victorian reader, who signs his letter, but wishes his name to be omitted from the article for personal reasons. We quote:

"An improvement on your mouse story. To the nose, this set had an awful 'hum.' The chassis had three half-inch holes in the back, where pickup terminals would be connected in the larger model. A semi-dried mouse head was poking through each hole from inside.

"Apparently they had entered the chassis by the dial drive but, being unable to return by the same route, had attempted to escape via the hole in the back of the chassis. I made a sworn declaration for this."

But enough of mice for the time being. We were more interested in some of the other experiences which this same correspondent mentioned in his letter. With his permission, we will expand them slightly and add comments as necessary.

NOVEL H.T. SHORT

A mantel receiver of well-known make stopped during the manufacturer's guarantee period and went back to the factory for attention. It was checked and pronounced OK, but subsequently began to behave in a most erratic fashion, stopping and starting intermittently.

It was then taken to a serviceman who inspected it thoroughly and again pronounced it to be in perfect order. Then it was brought along to the writer, fortunately during one of its "stop" periods. The output valve was eased up in its socket and the high tension voltage measured—exactly 30 volts. Simple, faulty electrolytic!

The chassis was naturally removed from the cabinet but found to be working perfectly, with normal high

frame, so that the latter became "hot" to the tune of 250 odd volts.

When the receiver was out of the cabinet, the frame of the speaker did not touch the chassis and there was no short circuit. In position, the dial just touched the edge of the speaker frame, so bleeding the high tension away through the output transformer.

It was ascertained afterwards that the chassis only was returned to the factory and sent to the previous serviceman, so that they had no chance whatever of locating the trouble.

SET HAD AN ECHO

Another client had a rather classy custom-built receiver but complained that a distinct "echo" could be heard at times behind the signal. The manufacturers of electric organs go to quite a deal of trouble to obtain this effect, and it was certainly unique to have it occur unintentionally.

On investigation, the "echo" turned out to be a tinny rattle from somewhere inside the entrails of the chassis and this was being heard as an unpleasant background to the output from the loudspeaker.

Ultimately the fault was traced to a Ferranti transformer which had been mounted firmly on the chassis but, for some unexplained reason, the lamination clamping bolts were very loose. The laminations were rattling badly under high excitation and a few turns with the screwdriver did the trick.

May I add a little anecdote to this correspondent's story while it is fresh in mind.

CASE OF FEEDBACK

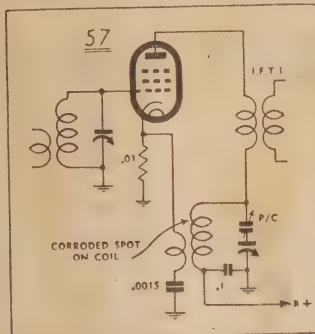
I walked into a "Ham" shack the other evening for purely social reasons and found the occupant busily installing new bypass condensers in the power supply. Rather nice condensers, too, the proceeds of a Disposals deal.

Many hands make light work, so the two of us got to work and soon had the condensers proudly in place. Leads attached, plugs in, power on and we were ready to check the "rig."

The moment the switch was closed, there was a violent howl from the modulator, which was only cured by turning the gain well back. Every attempt to increase the gain produced terrific feedback.

We checked the chassis earths, the microphone lead and plug, the high tension volts and all the other obvious things, without success. The rig still oscillated madly.

So we advanced the gain just be-



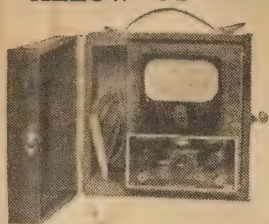
Corrosion caused this coil failure—a very difficult one to pick.

tension voltage. It was then operated on the bench for a period, with the volume control turned well back, but checked every few minutes at higher volume. No trouble developed, so the receiver was ultimately put back in the cabinet for a further trial.

This time there was not a sound to be heard and the high tension voltage had reverted to 30.

After a certain amount of prodding and juggling, it was found that a high voltage existed between the chassis and the frame of the speaker. Further investigation revealed a short between the plate end of the output transformer and the speaker

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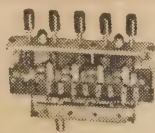
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low the unstable position and belowered into the microphone. The laminations of the filter choke nearly jumped out of the chassis and the plate current needle of the final performed violent gyrations—something that should never happen in a good "ham" station.

Well, we puzzled and prodded and poked until one of the wires fell harmlessly off the "hot" terminal of the final block filter condenser. I had made that particular joint and, in my haste, had released my hold on the wire before the solder was set. The final filter condenser was therefore not in circuit and many, many audio volts were developed across the filter choke. No wonder the poor thing buzzed so violently.

Remembering what I had written on the subject just a few weeks ago, I could only hang my head and do my best to blush. Worst part of it was that my amateur friend had read my article.

But back to the experiences of our Victorian friend:

"PISTOL PACKIN' . . ."

Every so now and again a particular receiver—a rather old job—would give forth a sound like a pistol shot but thereafter continue to operate normally. There was no visible spark when this occurred and the receiver had already been fitted with new filter and bypass condensers on the high tension line.

One way of tackling such a job is to operate the receiver initially with only the output valve in position and then progressively restore sections of the receiver to operation until the trouble appears. One is then able to examine the particular section of the receiver in detail, or assess its effects on other sections of the circuit.

In this case, the trouble stopped when the mica coupling condenser to the grid of the 42 output valve was disconnected and fate was kind enough to arrange a "plop" at the exact moment when a meter was connected to the grid circuit of the output valve. A definite upward "kick" was revealed.

As the coupling condenser was open to some suspicion, it was duly replaced and dismantled to reveal a puncture right through the layers of mica and foil—apparently the result of an accident during production.

There was not time to work out just how this fault could cause the pistol-like reports but the point to remember was that a faulty condenser in this position can be the culprit in such a case.

Last but not least a couple of stories in lighter vein. A dear old lady, who had spent most of her life as matron of a Melbourne hospital, had a three-valve receiver much like the midget set in R. and H. last December. "It has stopped completely," she said.

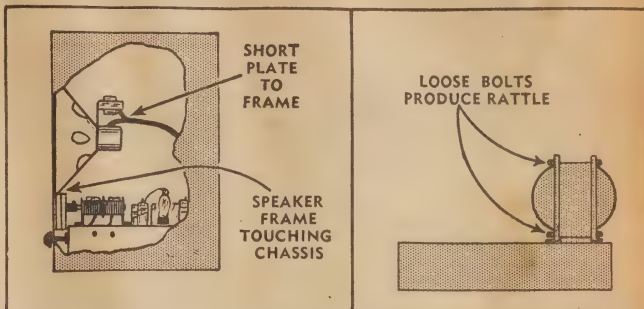
As an afterthought, she added that the wire outside had fallen and she had twisted it around to prevent it dragging across the path. As the set already had

an earth wire, her concern for the equilibrium of people using the path simply meant a shorted aerial and coil.

Removing the earth and operating the set with the earthed wire as aerial restored it to operation. I fixed the aerial next day, when there

advanced, there was a fair background of noise.

Evidently the autodyne was not oscillating and this was borne out by the fact that the noise was unaffected by shorting the oscillator section of the tuning gang. Shorting the gang likewise had no effect on



Two causes of rattles and "echo"—flimsy mounting of speaker transformer and loose audio transformer bolts.

was less chance of breaking a neck in the process.

Not quite so simple was the case of the would-be listener who acquired a 2.0 volt vibrator receiver for use in a weekender. Not having a suitable accumulator on hand, he remembered that there was a device by that general name in the car.

Despite the grease and all the rest of it, he laboriously disconnected the big 12-volt accumulator and lugged it up into the house. The receiver was duly connected to the terminals and switched on. He looked quite puzzled as he explained later how the dial lights had been very bright for a moment but wouldn't even glow now.

It is quite a painful task to explain about filament voltages and the need to purchase five new "toobs."

A NASTY ONE

Many thanks for the correspondents who have provided the material for the foregoing article. By way of conclusion, here is one of my own, and the nastiest one I have met with for many a day.

The set was an old-style autodyne superhet with the traditional valve line-up—57, 58, 57, 59 and 80. It sounded fully "alive" but would not receive stations. There was plenty of output from the pickup terminals and, with the gain control

the screen and cathode potential. "Easy," I thought, "the set has been used for long periods by a invalid and, since the original is in place, it is reasonable to assume that the valves are weak."

But I was in for a surprise, all the valves tested OK, including the venerable 59. Even assuming that this was not the original valve it could not help but be rather ancient. I haven't seen a new 59 many a day, or even a 2A5 replacement, for that matter.

SWITCHED VALVES

When replacing the valves, I switched over the two 57's in case the original 57 autodyne had a obscure fault, but the set still refused to function. Turned the chassis over and noted that the screen and plate voltages were normal—therefore, the circuit through the oscillator coil and IF transformers was in order.

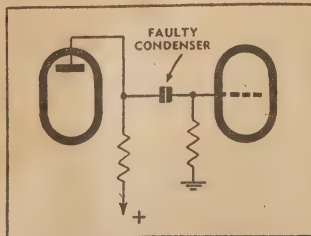
The next step was to switch the power off and examine the wiring in detail. The padder and condenser wiring was in order, both appeared to be in good shape, and a check with the ohmmeter showed no sign of a short-circuit. Likewise, the cathode bias resistor. I must confess I was becoming a little puzzled this time.

Autodyne converters are sometimes rather critical of the first IF transformer adjustment, so I checked IF alignment with the signal generator and screwed the autodyne ph trimmer in about a quarter turn. This was an emergency measure—the days of the type 15 battery autodyne; it sometimes made oscillation more certain at the expense of small drop in gain. Still no result.

Must be moisture in the oscillator coil—another point on which autodynes are rather critical.

Deploing my luck, I forthwith removed the coil can, inspected the connections, resoldered the wires and then adopted the drastic procedure.

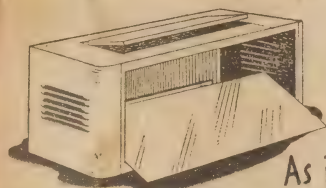
(Continued on Page 83)



A faulty coupling condenser caused mysterious "pops" in one receiver.

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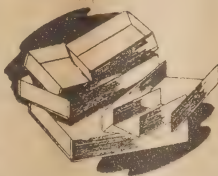
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LET'S TALK ABOUT COMPONENTS—TUNING COILS

THE important property of a coil—its electrical measurement—is referred to as its inductance. The inductance of a tuning coil is expressed normally as so many millihenries or so many microhenries, these being respectively equal to one thousandth or one millionth part of a henry—the basic inductance unit.

In practice, radio circuits seldom show the inductance value for coils, although there appears to be no real reason why it should not be marked just as definitely as condensers or resistors. But that's how it is and beginners will not be at any great disadvantage if they cannot memorize typical values of coil inductance. Sufficient to say that a typical broadcast band tuning coil has an inductance of 200 microhenries, while a short-wave coil for the 10-30 metre ranges falls into the 1 microhenry class.

INDUCTANCE

Physically, the inductance value depends in order on the number of turns of wire, the diameter of the winding, the length of winding and the gauge of wire used.

The number of turns and the coil diameter are the most important factors in practice, an increase in either one resulting in higher inductance.

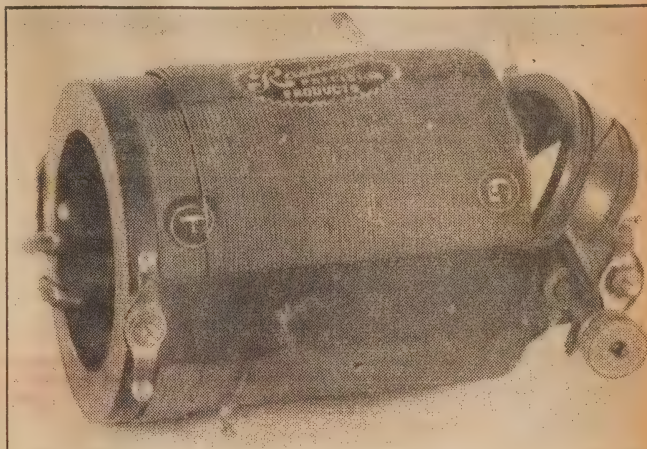
Putting things in another way, a coil can be made to have a certain inductance by winding a comparatively large number of turns on a small diameter former, or by winding fewer turns on a larger former. It is possible to calculate inductance by ordinary algebraical methods, but it would be rather outside the scope of this page to try to explain the process.

If you have any leaning in this direction, you can read up the subject in full in the "Radiotron Designers' Handbook" or other standard reference books. Let's get back to a simpler plane!

IDENTIFICATION

As we mentioned last month, the interconnection of a tuning condenser and tuning coil renders a receiver "resonant" at a particular frequency, to which it is also said to be "tuned." Tuning over a range of frequencies is usually accomplished by having a coil of fixed inductance associated with a condenser of variable capacitance.

We have already explained the necessity for, and typical capacitance figures of, variable condensers, and can be assured that readers of these matters in mind. The one we must now grasp is that



An old type space-wound tuning coil with a variable reaction coil operated by a spindle.

Following our discussion last month of variable condensers, it seems that the obvious step in this issue is to consider tuning coils—the components with which they are usually associated. The subject is complicated by the fact that coils can be purchased commercially or wound by hand.

It is just as important to have a coil of the correct inductance for the purpose.

RESONANCE

This may seem a rather obvious and elementary point to make but the fact is that some young constructors, who are most particular about a condenser or resistor rating, tend to regard a coil merely as a few turns of wire on a round tube. As we have just said, the coil and condenser are equally important in determining the tuning range of a receiver.

Since circuits seldom specify inductance values, and since coils are seldom marked that way, the newcomer can hardly be blamed for not attaching full importance to these figures. All he can hope to do is to make sure that a coil is for the broadcast or a particular short-wave band, or, if the coil is home wound, that it conforms fairly closely to specifications in regard to turns, wire gauge and former diameter.

Most tuning coils involve two or even three separate windings closely associated to the one former. The term coil, therefore, can refer either to a single winding or to the assembly of several windings on a former.

Without entering into circuit de-

tails, the "primary" winding on a coil is generally the one through which the signal is derived. In an aerial coil it would be connected to the aerial-earth circuit, while, in an R.F. coil, it would be connected to the plate of the R.F. amplifier valve.

The "secondary" winding is generally the one associated with the tuning condenser and connected to the grid circuit of the following valve. This winding therefore governs the tuning range of the receiver and must have the correct amount of inductance.

REACTION WINDING

Finally, there may be a reaction winding, the purpose of which I have already explained in a previous article. There is no hard and fast rule about the position for primary and reaction windings on a coil, although individual design may recommend a particular arrangement. Sufficient to say that these auxiliary windings must give the right amount of coupling to ensure correct operation of the circuit.

In its simplest form a tuning coil consists of one or more single-layer windings on a tubular cardboard or bakelite former. Such a coil is conventionally referred to as a "solenoïd." In the early days, solenoids were often wound on 2in. or 2

diameter formers, and with comparatively thick wire, so that they were from 3in. to 4in. long overall.

Electrically, these early coils were quite efficient and, if necessary, beginners can still work winding data compiled twenty years ago. The combination of inductance and capacitance necessary to cover the broadcast band has definite mathematical limits and yesterday's coils and condensers will still serve the purpose, even though their physical form differs greatly from the modern product.

Large solenoid coils had certain disadvantages, which ultimately resulted in their becoming obsolete. The obvious one was that bulky coils hampered the efforts of designers to produce neater and more compact receivers.

COIL COUPLING

Secondly, a large coil inevitably is surrounded by a large magnetic field and, where more than one coil is used in a receiver, they have to be well separated in order to prevent interaction between the fields, and consequent instability. That is why many old-time receivers were built on lengthy baseboards, with three tuning coils along the back tipped at 5 degrees from the horizontal. Even if there is only one large coil in a receiver, it is likely to produce hand capacity effects when the detector is on the fringe of oscillation.

Because of this, there has been a tendency to make coils smaller by winding them with finer wire on smaller diameter formers. In practice, solenoids are seldom wound for the broadcast band on less than 1in. diameter former, using about 32 gauge wire. A solenoid coil more compact than this, having sufficient inductance for the broadcast band, would be rather inefficient.

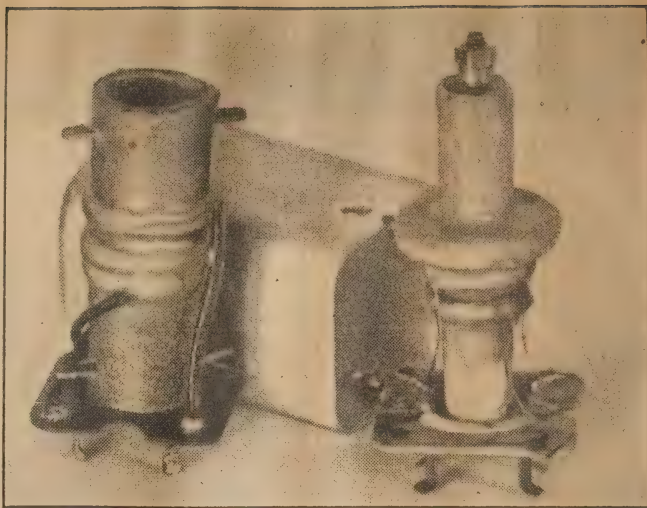
At this point we can digress to make a few observations which will assist readers to recognise a solenoid coil as being useful or otherwise for broadcast band coverage.

NUMBER OF TURNS

Assuming that it must have sufficient inductance to tune normally over the broadcast band, a solenoid on a 1in. diameter former must have about 120 turns of wire on the secondary winding. The wire will generally be about 32 B. & S. or 34 SWG gauge enamelled, this being necessary to achieve a moderate winding length.

On a 1½in. diameter former, the wire will normally be one or two gauges heavier and the number of turns will approximate 110. One can so expect 30-32 gauge enamelled wire on a 1½in. former, and about 105 turns.

Coil formers having a diameter of 1in. or greater generally date back to an earlier era, when the emphasis was on obtaining highest efficiency from a solenoid coil, irrespective of size. One can expect to find silk or cotton covered wire on these sizes. If only because the fashion prevailed the same time. Therefore, a typical 1in. diameter broadcast coil is likely to have about 70 turns of 26-28 gauge



Two types of modern tuning coils with cans removed. At left is an air-cored coil, and at right an iron-cored coil. Both are wound with litz wire and heavily impregnated against moisture.

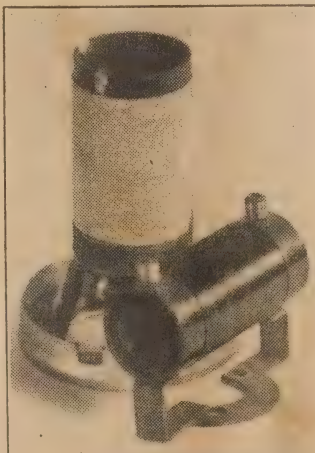
DSC or SCC wire. For a three-inch former, the number of turns is likely to be about 50 and the gauge of wire 22-24 DSC or SCC.

In each case, reference is made only to the main secondary winding, normally tuned by the variable condenser. The other associated windings will generally be found to have a proportionate number of turns, say 15-20 per cent for the primary, and 30-35 per cent for the reaction winding—if any. Incidentally, DSC means double-silk-covered and SCC means single-cotton-covered.

It must be realised that the figures just given are only to be accepted as a general guide and represent a

very sketchy outline of the limits and trend of solenoid coil design since the broadcast band has been confined to its present limits.

If you have on hand a coil which conforms roughly to our statement of diameter and number of turns, you can safely assume that it has been intended to tune over the broadcast band with a conventional .0004 mfd. condenser. Alternately, if you are keen to experiment, you can wind coils roughly according to our suggestions and "prune" them to give the best results. You will probably find that the larger coils will give somewhat better results but be more prone to hand capacity and feedback effects.



Two types of tuning coils used in the 1930-33 era. These are plain windings in contrast with the "pie-wound" coils shown above.

SHIELDING

To become historical again, the tendency to interaction between coils in a compact layout, forced designers to go even further than reducing the former size and wire diameter—they had to resort to shielding. This involves mounting the coils in separate compartments, with their tuning condenser and the associated valve or, alternately, providing the coils with separate shield cans. The cans are normally of aluminium or other non-magnetic metal, and made at least twice the diameter of the coil former, and longer than it by at least the coil former radius.

Shielding a coil reduces its inductance slightly, necessitating extra turns for the same characteristics. These extra turns involve additional losses, so that a shielded solenoid is normally a little less efficient than its unshielded counterpart. In practice this loss was less important than the advantages inferred by shielding and, furthermore, produced improvement in wave performance.

eased the requirement on coil characteristics for the same net result.

So much then for solenoid coils, large and small, shielded and unshielded. Commercially the solenoid is out of date, but it remains of interest to beginners and home builders because the solenoid is the only coil which can readily be wound by hand.

Many years ago, commercial coil manufacturers discarded the solenoid principle altogether and began to wind their coils in honeycomb "pies." Irrespective of spelling, that is how the word is pronounced.

SPECIAL WINDING

Fine wire was used and wound criss-cross fashion by special machines on 3-8in. or 1/2in. diameter formers. The pies were—and are—no more than a quarter inch wide but there are many layers in each one. Each individual turn is spaced from the adjacent one and crosses the wires below and above it at an angle. This spaced method of winding gives rise to the term "honeycomb" and allows many turns to be concentrated in a small space without introducing excessive capacitance across the coil.

Where sufficient inductance cannot be obtained from a single pie, two or more pies are wound side by side and connected in series.

The simple pie-wound coil is not startling in terms of electrical efficiency but the vitally important point is that it can be housed in a coil can which itself is no larger than the solenoid coil—something about 3in. high and about 1 3-8in. round or square.

It is not hard by inspection to pick out a coil of this type. Even though immersed in wax, the pies can be discerned quite easily and one can generally note whether the grid winding is wound with single strand copper wire.

LITZ WIRE

Next step in the development of coils was the introduction of "litz" wire for coils. At first glance, litz wire looks like rather "waxy" silk-covered wire but closer inspection reveals that it is composed of several hair-like strands, enamelled, twisted together and silk covered.

Litz wire has much lower losses than a single conductor, and coil manufacturers have used it extensively for the secondary windings of their tuning coils. The windings tend to be a little more bulky but are electrically more efficient. You can tell a litz coil by examining the leads coming from the tuned winding. The auxiliary windings are generally of solid copper wire.

Close on the heels of litz wire came the technique of inserting a "slug" of powdered iron on the inside of the coil former, where it can generally be seen by those who look

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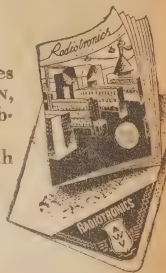
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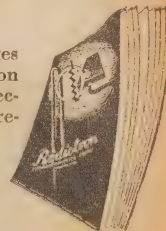
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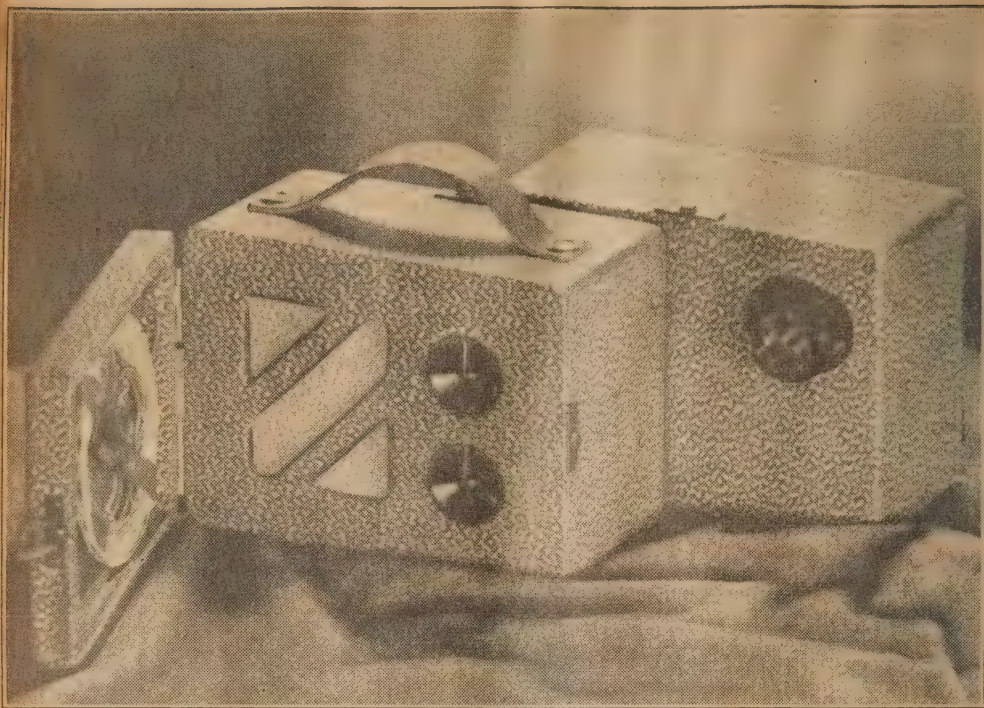
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(Continued on Page 37)



This picture shows the complete outfit. The receiver lid is open, and the loop aerial, which may be covered over for appearance, is shown. Behind the set is the small power supply. In practice the two cabinets are clipped together, and may be carried about in ordinary mantel style.

FLASH! — THE MULTI-TALKIE

Last year we "beat the gun" with our "Handie Talkie" and told you how to build a personal portable weeks before equivalent commercial models were available in the shops. This year we have done it again with our latest "baby"—a personal portable which will operate from anything but the gas mains. We're tipping that it will set a style for the forthcoming season.

A PERSONAL portable has an appeal all its own. You can hang it over your shoulder or pack it in the lunchbag. You can use it on the beach or carry it into the mountains. Train, ferry or bus, it's all the same to one of these versatile little receivers. No wonder that listeners awaited their release last season with such interest.

But there's a real catch to this romantic story. It costs just on £20 to buy a personal portable—or something less if you build it yourself—and that's as much money as you'll pay for a regular mantel receiver. But, whereas you can use a mantel set for hours and weeks on end without even noticing the running cost, our portable has to remain silent

except when you take it out-of-doors.

The reason is simple, for your portable runs on batteries, and rather expensive batteries at that!

It is not for us to go into the problems and economics of battery manufacture. Sufficient to say that, despite many advances in technique, it is still not possible to combine long service life and compactness in a battery, and sell the product to the public for a few shillings. In a sense, a personal portable is a picnic luxury, like ice cream and a beach umbrella. Very nice if you can afford it.

UNIVERSAL OPERATION

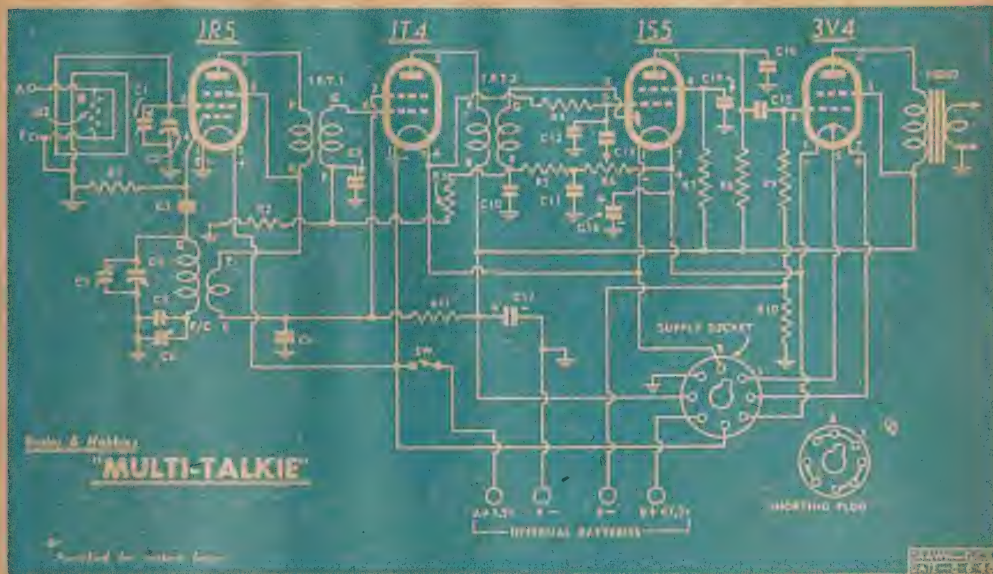
How much better if the portable could be brought home and operated

by the bedside at trifling cost. The initial outlay wouldn't look quite so formidable and your luxury set would assume a real utility value. In short, the ideal personal portable should be capable of operating from the power mains.

"Universal" operation was, of course, featured in a few conventional portables of prewar design, but, to the best of our knowledge, has never been applied commercially to a miniature set. For the first time, Radio & Hobbies tells you how.

Our new "baby" operates out-of-doors like any other personal portable, with built-in batteries and loop aerial. It is smaller overall than the "Handie Talkie" and has a more stylish cabinet. A plug, fitting

CIRCUIT DIAGRAM OF THE MULTI-TALKIE



Study the circuit carefully. It is not complicated, but the special filament connections make it unusual. Take great care to connect the starting pins the right way round. Note that we have marked both socket and plug with pins 1 and 8, so that you can't go wrong.

in the back lid is the only suggestion of anything unusual. But the suggestion is well founded.

You can bring the "baby" inside, clip on an extra section to the cabinet and your personal portable becomes a bedside radio, operating from the power mains. In fact, we have gone still further and so arranged the design that operation either from

external batteries or from a vibrator supply should also be possible. But that is another story, which can be followed up at a later date. For most folk, a-c mains operation will be the big feature of this new set.

BEATING THE GUN

That is why we are describing a Personal Portable in the July issue—

smack in the middle of the Australian winter. You can save up the necessary "hard-earned," collect the parts and build the two parts of this unique set—the receiver proper and the a-c power supply. Then, with just your nose and one ear outside the blankets, you can use it to listen to the fight, the cricket or what have-you.

PARTS LIST AND CIRCUIT KEY

- 1 Chassis $6\frac{1}{2}'' \times 3\frac{1}{2}'' \times 2''$ deep.
- 1 Cabinet with hinged door. Inside dimen., $6\frac{1}{2}'' \times 4\frac{1}{2}'' \times 3\frac{1}{2}''$. Depth of door inside is $\frac{1}{2}''$.
- 1 3" speaker with transformer, 8000 to 10,000 ohms.
- 1 Midget 2-gang condenser, approx. .0004 mfd. per section.
- 1 Midget oscillator coil (wound on grid resistor).
- 1 suitable loop aerial.
- 2 Midget IF transformers, 455 kc.
- 1 Midget "off-on" switch.
- 1 1R5, 1 1T4, 1 1S5, 1 3V4 valves.
- 1 67½ volt miniature B battery.
- 2 1.5 volt cells, small size (No. 935 or similar).
- 2 knobs, flush-fitting type.
- 4 miniature valve sockets, button type.
- 1 Octal socket, small wafer type.
- 1 Octal plug.

SUNDRIES

Plastic hook-up wire, nuts, bolts, solder and solder lugs, spaghetti, scrap aluminium for bracket, spring brass or copper for battery clip, shielded wire and odd inches of suitable size spaghetti

to cover braid at appropriate points, clips and handle for cabinet.

RESISTORS

- R1 0.1 meg. (oscillator coil wound on this resistor).
- R2 1.0 meg. $\frac{1}{2}$ W.
- R3 1.0 meg. $\frac{1}{2}$ W.
- R4 10 meg. $\frac{1}{2}$ W (if available).
- R5 0.05 meg. $\frac{1}{2}$ W.
- R6 1.0 meg. potentiometer (small).
- R7 3.0 meg. $\frac{1}{2}$ W.
- R8 1.0 meg. $\frac{1}{2}$ W.
- R9 3.0 meg. $\frac{1}{2}$ W.
- R10 500 ohm $\frac{1}{2}$ W.
- R11 4000 ohm $\frac{1}{2}$ W.

CONDENSERS

- C1 30 pf. trimmer.
- C2 .0004 mfd. (section of gang).
- C3 .0001 mfd. mica.
- C4 .0004 mfd. (section of gang).
- C5 50 pf. mica.
- C6 455 kc. padder, compression type.
- C7 30 pf. trimmer.
- C8 .01 mfd. mica.
- C9 .1 mfd. midget tubular.
- C10 50 pf. mica.

- C11 50 pf. mica.
- C12 50 pf. mica.
- C13 .005 mfd. mica.
- C14 .01 mfd. mica.
- C15 .005 mfd. mica.
- C16 50 pf. mica.
- C17 8 mfd. midget electrolytic.
- C18 25 mfd. 40 PV. electrolytic

PARTS LIST (AC power supply)

- 1 Chassis $6\frac{1}{2}'' \times 2\frac{1}{2}'' \times 1\frac{1}{2}''$.
 - 1 Cabinet with removable back cover. Inside dimen., $6\frac{1}{2}'' \times 4\frac{1}{2}'' \times 2\frac{1}{2}''$ (ventilation holes at rear and bottom).
 - 1 small power transformer, 150 v. ct. 150 v. 30 mA., 6.3 v. 1 A.
 - 1 Midget filter choke, 60mA.
 - 1 6X5GT.
 - 1 8 mfd. 525 PV. electrolytic.
 - 1 500 mfd. 12 PV. electrolytic.
 - 1 1000 ohm 1 watt resistor.
 - 1 1650 ohm 5 to 10 watt wire-wound resistor.
 - 1 Octal plug with cover.
 - 1 Octal socket.
- Resistor strip, hook-up wire, power flex and plug, nuts and bolts, etc.

ANOTHER VIEW OF THE RECEIVER

When the summer breezes begin to blow, buy a couple of torch cells and a B-battery, slip them into place and you have a regular portable. The power supply section of the cabinet remains at home.

But why the reference to a "bed-side" set? We'll explain that. You can use the set anywhere you please, of course, but we used that expression to convey the idea of something different from a mantel receiver.

The ordinary mantel receiver has four or five a-c valves, which will operate all day and every day for months on end. The speaker, the cabinet, in fact, everything about the set, is designed to deliver ample power for even a big room.

A baby portable, with its tiny light-drain valves and its midget speaker is a very different proposition. It cannot produce the same volume of sound and the fine filaments necessarily have a shorter service life than the big a-c heaters. It is a smaller, quieter, more intimate type of set, which fits naturally into the requirements of a bedroom, a study, or a quiet lounge.

TECHNICAL PROBLEMS

But enough of these preliminaries. The real problems in the design are technical. To operate a battery receiver from the power mains requires a well-filtered d-c supply for the filaments as well as the high tension. A-c operation of the filaments is out of the question.

The provision of a suitable high tension supply presents no problem, but the filament circuit is a different proposition. The initial requirement is for 1.4 volts at approximately 0.25 amp—figures which cannot readily be met with the ordinary run of power supply components. It would involve rather a metal rectifier, a couple of special smoothing chokes and filter condensers of very high capacitance. These add up to a proposition which is neither cheap nor compact.

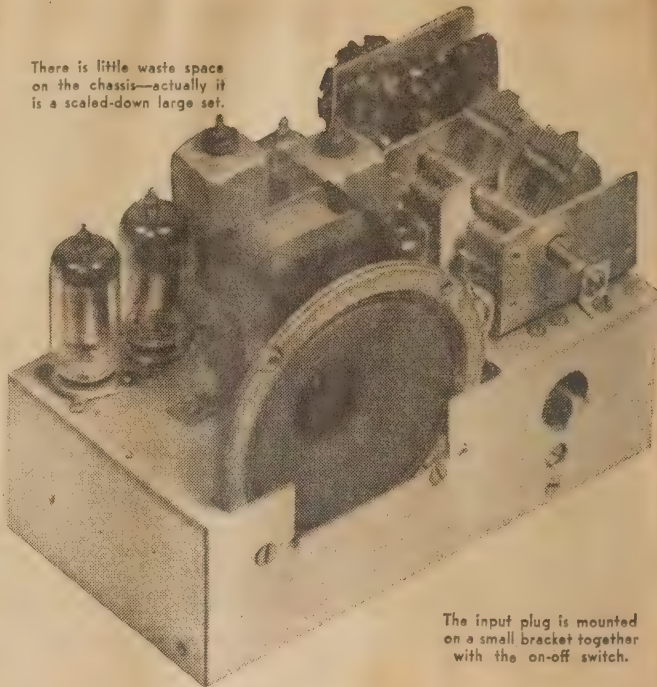
The alternative is to connect all filaments in series so that the requirement is nominally 7.0 volts at 50 mA., a figure of current which is well within the capabilities of a conventional rectifier and filter system. Add to this about 10 milliamps for the high tension current and the total drain of the set is still only 60 mA.

POWER SUPPLY

In practical form, the power supply is required to deliver from 60 to 90 volts filtered d-c at about 60 milliamps. Of this total, 10 milliamps are fed to the high tension line, while the remaining 50 odd milliamps is passed through a dropping resistor to provide 7.0 volts for the filaments. The impedance of all circuits is such that filtering is possible with condensers of quite usual value, while the requirements are ordinary in regard to the transformer, choke, and rectifier.

The ultimate details of the power supply can come later, the point at this juncture being to demonstrate the need for the series rather than a parallel filament connection for d-c mains operation.

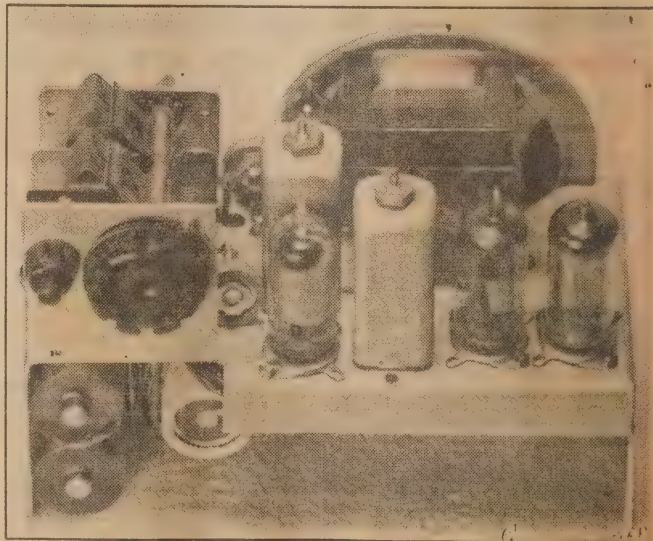
There is little waste space on the chassis—actually it is a scaled-down large set.



The input plug is mounted on a small bracket together with the on-off switch.

For battery operation, just the reverse is true, because it is clearly impractical in a midget receiver to fit in sufficient torch cells to operate a 7.0 volt filament network. Quite apart from the matter of weight and space, it would be troublesome to

provide a ready means of connection for all cells. Thus, the designer of a universal portable is faced with the problem of changing the whole filament network from series to parallel in order to cater for both methods of operation.



Another view of the set from the rear. When not used with its own battery, the battery switch is turned off.



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This list of FERGUSON TRANSFORMERS represents our standard range which we are at present supplying the Radio trade.

This is by no means our complete range when taking into account those Transformers being supplied to manufacturers' special requirements.

Transformers of this type cannot possibly be listed in the space available and manufacturers are requested to contact us direct regarding their special Transformer requirements.

STANDARD RANGE TYPES

OUTPUT TRANSFORMERS

| TYPE | PRIMARY | SECONDARY | RATING | TYPE | PRIMARY | SECONDARY | RATING |
|------|-----------------------------|---------------------------------|--------|-------|--|--|--------|
| OP1 | 5000 and 2500 ohms S.E. | 12.5, 8.0 & 2.3 ohms Voice Coil | 10W | OP18 | 3800 ohms P-P | 500, 250 and 125 ohms | 60W |
| OP1A | 5000 and 2500 ohms S.E. | 500 ohm Line | 10W | OP19A | 5000 ohms P-P | 12.5, 8.0, 2.3 ohms Voice Coil | 15W |
| OP2 | 5000 ohms P-P | 12.5, 8.0 & 2.3 ohms Voice Coil | 15W | OP19B | 5000 ohms P-P | 500, 250 and 125 ohms | 15W |
| OP3 | 6600 ohms P-P | 12.5, 8.0 & 2.3 ohms Voice Coil | 15W | OP20 | 11,800, 8400 ohms P-P (F.A. Range) | 500, 250, 166 & 125 ohms | 150W |
| OP4 | 10,000 ohms P-P | 12.5, 8.0 & 2.3 ohms Voice Coil | 15W | OP21 | 8000 ohms P-P | 500/125 ohms | 15W |
| OP5 | 5000, 6600, 10,000 ohms P-P | 12.5, 8.0 & 2.3 ohms Voice Coil | 15W | OP22 | 3250 ohms S.E. 85 M.A. (30-15,000 C/s) | 2.3 or 500/125 ohms | 10W |
| OP6 | 5000 ohms P-P | 500, 250 and 125 ohms | 15W | OP23 | 3250 ohms S.E. 85 M.A. (30-15,000 C/s) | 12.5 or 8.4/2.1 ohms | 10W |
| OP7 | 6600 ohms P-P | 500, 250 and 125 ohms | 15W | OP25 | 10,000 ohms P-P (20-30,000 C/s) | Any Two Impedances in 4 to 1 ratio e.g. OP25 500/125. OP25 8.4/2.1 OP25 10/2.5 | 15W |
| OP8 | 10,000 ohms P-P | 500, 250 and 125 ohms | 15W | OP25 | 10,000 ohms P-P | 500 ohm Line 10 Tappings | 15W |
| OP9 | 5000, 6600, 10,000 ohms P-P | 500, 250 and 125 ohms | 15W | OP15M | 6600 ohms P-P | 500 ohm Line 10 Tappings | 15W |
| OP10 | 5000 ohms P-P | 500, 250 and 125 ohms | 25W | L1 | 500 ohms | 12.5, 8.0, 2.3 ohms | 10W |
| OP11 | 6600 ohms P-P | 500, 250 and 125 ohms | 25W | U1 | 30,000, 20,000, 14,000, 10,000, 7000, 5000 | 2.3 ohms Voice Coil | 10W |
| OP12 | 10,000 ohms P-P | 500, 250 and 125 ohms | 25W | | 2500 ohms P-P-R S.E. | Universal Speakers. | |
| OP13 | 5000, 6600, 10,000 ohms P-P | 500, 250 and 125 ohms | 25W | | | | |
| OP14 | 5000 ohms P-P | 500, 250 and 125 ohms | 32W | | | | |
| OP15 | 6600 ohms P-P | 500, 250 and 125 ohms | 32W | | | | |
| OP16 | 10,000 ohms P-P | 500, 250 and 125 ohms | 32W | | | | |
| OP17 | 5000, 6600, 10,000 ohms P-P | 500, 250 and 125 ohms | 32W | | | | |

CLASS B DRIVER AND INTERSTAGE TRANSFORMERS

| | | | Prim to 1 Sec. RATIO | | | | |
|-----|------------------------|--------------------------|----------------------|-----|--|--------------------|-------------|
| IP1 | Single 6J7G Triode | Class A1, AB1, P-P Grids | 1 | IP3 | P.P. Class A, A1 Triodes 45's, 2A3's, etc. | Class B P.P. Grids | 2, 3 or 4 |
| IP2 | Single 6V66 Triode | Class AB2 P.P. Grids | 2.5 | IP4 | S.E. or P.P. Triodes | Class B P.P. Grids | 2.5 or 2.15 |
| | 40 M.A. D.C. Unbalance | 807, etc. | | | | 809, 830B, etc. | |

MODULATION TRANSFORMERS

| | | | | | | | |
|-----|---------------------------|--|-----|-------|---------------|-----------------|------|
| M25 | 6000 & 8000 ohms P-P | 10,000, 7000, 5000 ohms, 100 M.H. | 25W | M50M | Multi Primary | Multi Secondary | 50W |
| M50 | 3800, 6600, 8000 ohms P-P | 10,000, 7500, 6500, 5500, 4500, 3500 ohms 150 M.A. | 50W | M125M | Multi Primary | Multi Secondary | 125W |

VIBRATOR TRANSFORMERS

| | | | | | |
|--------|-----------------|-----------------|----------|------------------------------|---|
| 6V/150 | 6V at 0.9A D.C. | 150V at 25 M.A. | 6V/250 | 6V at 3.4A D.C. | 250V at 60 M.A. |
| 6V/200 | 6V at 2.9A D.C. | 200V at 50 M.A. | 6V/240/U | 6V at 3.9A D.C. or 240V A.C. | 250V at 60 M.A. 6.8V at 2A (A.C.), using 6X5GT Non Sync. Operation. |

POWER TRANSFORMERS

| | | |
|-----|-----------|----------------------------------|
| P30 | 240V A.C. | 150V/150V at 30 M.A. 6.3V at 2A. |
|-----|-----------|----------------------------------|

FILTER CHOKES

| | | |
|---------|------------------------|-------------------------|
| C30/25 | 30 Henries at 10V A.C. | 100 C/s + 25 M.A. D.C. |
| C12/200 | 12 Henries at 10V A.C. | 100 C/s + 200 M.A. D.C. |

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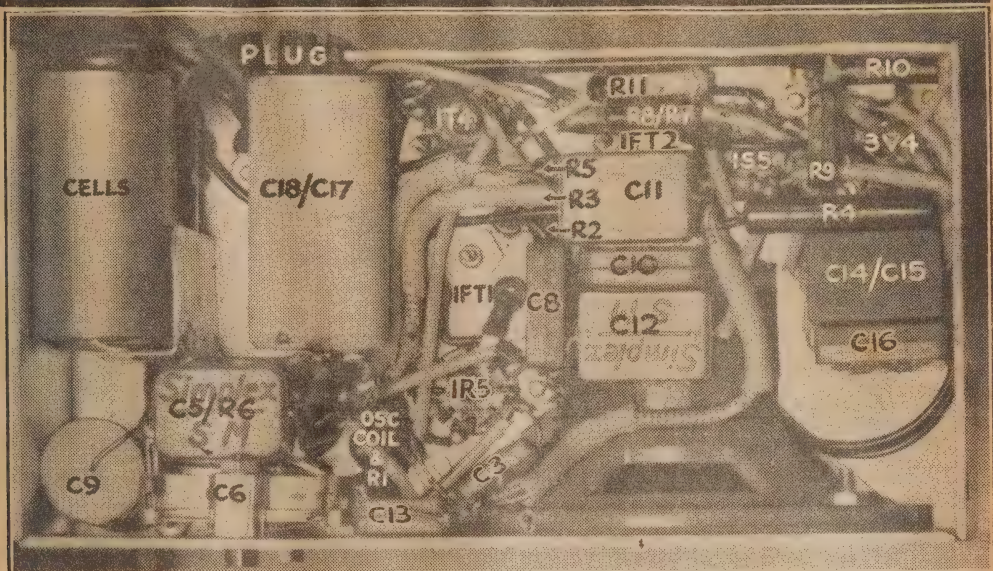
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PLACEMENT OF PARTS FOR MULTI-TALKIE



This picture shows most of the parts under the chassis. Be careful to keep these as close to the chassis as possible to allow for the B battery. The A batteries are in position.

GRID BIAS

It would be sufficient if that were the whole problem, but a change in the filament wiring also involves a change in the effective grid bias on all valves. The designer thus has to arrange some simple method of switching over seven or more filament connections, while preserving suitable bias conditions. Last but not least the receiver has to be disconnected from the internal batteries and made accessible to the external power supply.

It did not seem feasible in a personal portable to accomplish all this with a conventional switch, as it would take up far too much space in the cabinet. A socket would still be necessary in any case to facilitate connection to the external supply. Our own solution to the problem is best explained by reference to the circuit diagram.

Basically, the filaments of all four valves are connected in series, the negative pin of the 1R5 being earthed and the positive pin of the 3V4 being connected to pin two of an octal power socket. This socket is actually mounted behind the gang condenser in a convenient position for connection to the external power supply.

Wires are run from pins 4, 8, and 1 on this socket to specific points on the filament network, while pin 7 is earthed. For series operation, using an external power supply, a voltage of approximately 7.0 is applied between pins 2 and 7, the latter being earthed and equivalent to pin 1. With no connection to pins 3, 6, and 1, the filaments are in

series and the voltage divides evenly across them. The first three valves receive 1.4 volts each, and the same voltage appears across each half of the 3V4 filament.

For parallel operation, a plug is inserted in the socket carrying a shorting link between pins 7, 8, and 1, and between pins 2, 3, and 4. The first shorting link earths one side of the 1T4 and 1S5 filament and the centre of the 3V4 filament.

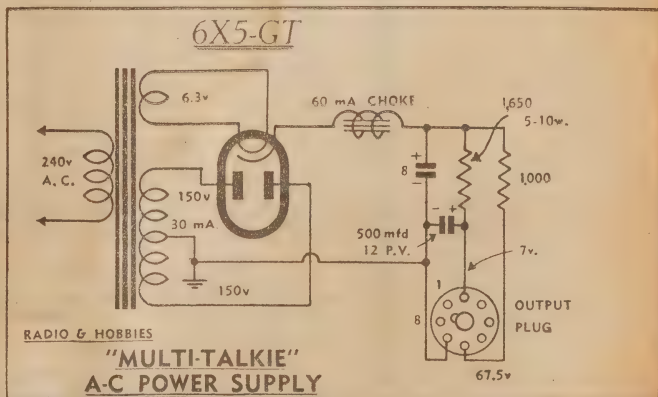
OPERATION OF PLUG

A potential of 1.5 volts is applied to the positive end of the 1R5 filament, to the 1T4 filament, and to pin 4 on the power socket. It is transferred by the second shorting link to pins 2 and 3 and thence to the fila-

ments of the 1S5 and 3V4. In other words, insertion of a dummy plug into the power socket converts the filaments to parallel operation and causes the battery "off-on" switch to operate normally.

The switch, of course, does not operate with an external power supply. It must be left in the "off" position at all times except when operation from the internal batteries is required. If left "on" with the dummy plug removed, the internal "A" battery will be discharged through the 1R5 filament.

So much for the actual filament circuit. You will note, by the way, that the internal "A" battery must be connected between earth and the vacant side of the "off-on" switch.



The circuit of the A.C. power supply.

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Now, let us see what happens in the bias circuits. First of all, the output valve.

You will note that the grid resistor connects to a back bias resistor and thence to the negative side of the internal "B" battery. When high tension is derived from the internal battery, therefore, a voltage drop occurs across the back-bias resistor, and this is applied as an operating bias to the grid.

On external supply, the negative side of the high tension is returned direct to chassis via pin 7, so that no current flows through the back bias resistor and no bias is developed across it. However, at the same time, the filaments have been connected in series, so that the bias is now obtained from the network, being equal to 4.2 volts.

The fact that only 4.2 volts is available from the filament network dictates the use of the 3V4 output valve instead of the 3S4, which requires almost double the operating bias.

BIAS RESISTOR

One important point: The back-bias resistor is specified on the circuit as 500 ohms—a figure which gives a no-signal drain of just under 10 milliamperes from the 67.5 volt battery. You can reduce this to about 8.5 milliamperes, with an increase of distortion, by using a 600 ohm back-bias resistor. In each case, the current may drop by about 1 milliamperes on strong signals. So much for the output valve.

The 1S5 triode is easily catered for, since the grid returns to filament minus through a 10 megohm resistor. In other words, it uses grid-leak bias and the grid-to-filament potential remains the same, irrespective of whether the filament is at earth potential or halfway along a series network. The 1S5 diode return is bound up with the AVC system and the bias on the preceding valve. The diode load is actually a 1 meg. volume control, and it is returned to the positive side of the 1S5 filament. The AVC is fed through a 1.0 meg. resistor to the 1T4 grid circuit and thence to earth through another 1.0 meg. resistor.

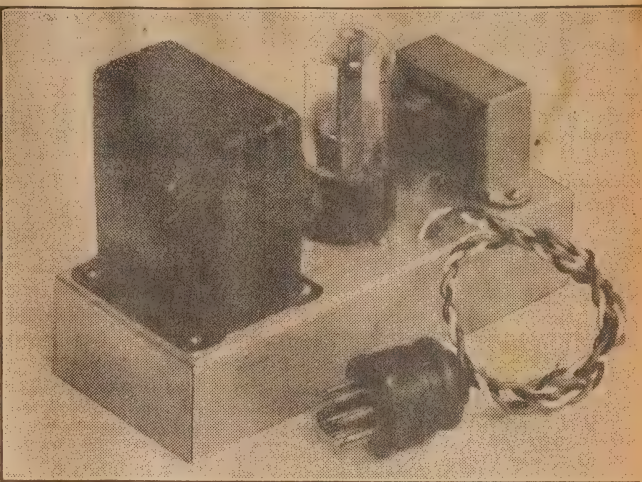
SERIES FILAMENT

When the filaments are operating in series, the "F"—pin of the 1T4 is 1.4 volts positive with respect to earth, while the 1S5 "F"—pin is 2.8 volts positive.

If you trace through the AVC/diode network, you will find that the 1T4 grid circuit is 1.4 volts positive and the diode return is 2.8 volts positive. In other words, there is zero initial bias on the 1T4 grid and on the 1S5 diode—exactly what we want.

With the parallel connection, the diode load is returned virtually to a point 1.4 volts positive, but the diode conducts sufficiently to maintain the AVC line at something very close to earth potential. The diode operates quite normally under these conditions. The 1T4 filament is at earth potential as the 1T4 grid like- in the absence of an AVC volt-

THE MULTI-TALKIE POWER SUPPLY



The power supply is very simple and makes a particularly neat unit.

age. The bias arrangement for these two valves are, therefore, satisfactory for either method of operation.

The 1R5 operates in all cases with zero bias. AVC is applied only to the 1T4 I.F. amplifier, but its operation should be adequate to cope with the expected signal pickup of a loop aerial. If, in exceptional circumstances, overloading does occur, the loop can be turned broadside to the station and the signal attenuated by this means.

The remainder of the circuit is more or less straightforward, and does not differ radically from any other comparable design using the same series of valves. Thus, the arrangement of the loop aerial and the oscillator circuit of the 1R5 is similar to that in our "Handie Talkie" except for the inclusion of a 4000 ohm resistor in series with the oscillator anode and screen supply. This resistor is not necessary for 67½ volt operation, but it does permit the receiver to operate safely from an external supply of up to 90 volts. This latter voltage is within the ratings of the 1S5 and 3V4, and would make possible greater power output.

SPEAKER LOAD

The loudspeaker should be fitted with a transformer reflecting a load of 10,000 ohms. We found it desirable to earth one side of the voice coil winding to the chassis in the interests of stability. As a matter of fact, the particular loudspeaker used in the original has a moulded plastic housing, which does not earth the magnet structure and the transformer core. You may find it desirable to carry the earthing one step further and arrange a clip to bear firmly against the magnet.

Space does not permit more lengthy discussion of the electrical circuit, but other points should be

sufficiently obvious from the diagram. The construction of a personal receiver is a rather specialised task which should not be attempted, we feel, by enthusiasts who have not reached the stage where they can readily interpret schematic diagrams.

Now for the mechanical side.

Since we envisaged this receiver being used in the home we decided to drop the tall cabinet idea of the "Handie Talkie" and give you something more along the lines of a man receiver. Thus, the speaker and controls need to be mounted side by side. This arrangement, coupled with the necessity for installing a power plug at the rear of the chassis more or less obviates the possibility of having anything but a very small loop inside the cabinet.

LOOP SIZE

Broadly speaking, the pick-up loop increases with physical size and with separation from other metal masses. These two factors decide us in favor of fitting the loop in a lid which can be closed up when the set is not actually in use. A further advantage is that rotation of the lid makes it possible to receive static under optimum conditions without disturbing the cabinet proper. Having arrived at these major decisions the size of cabinet, details of the use of flush knobs and so purely amount to achieving the balance and appearance.

Similarly, there are various ways of laying out the components in space available inside the cabinet but the prime purpose in our design has been to preserve a conventional chassis layout, avoiding confusion which might result if so of the major components were mounted horizontally on odd brackets.

The finished chassis measu-

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| 24v. | 350 | 100 2 | 0 0 |
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| 12v. | 215 | 50 1 | 10 0 |
| 12v. | 300 | 60 1 | 10 0 |
| 12v. | 350 | 60 1 | 10 0 |
| 12v. | 375 | 150 4 | 10 0 |
| 12v. | 275 | 110 3 | 0 0 |
| 12v. | 600 | 140 5 | 0 0 |
| 12v. | 550 | 350 6 | 0 0 |
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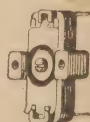
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6 1-8in. x 3½in. x 2in., has a cut-out at the rear to hold the batteries, and a section bent upwards to carry the power socket and the "off-on" switch. The gang condenser is mounted on the extreme right and should be set far enough back from the front of the chassis to allow the collar on the flush-fitting knob to pass by at least 1-8in. behind the front line of the chassis. Adding to this amount the slight space between the chassis and cabinet, and the thickness of the cabinet wall, you will find that the particular type of knob will be more or less flush with the front of the cabinet. It is noteworthy in passing that these knobs have a small spring insert, which is meant to grip a flat on the ¼in. spindle. You will, therefore, have to file a flat on the gang spindle in such a position that it will bring the pointer of the knob horizontal with the gang in mesh, and describe the upper arc of a circle as the gang is turned out of mesh.

V. CONTROL MOUNT

The volume control mounts on a special bracket below the tuning gang and it must be set far enough back for the flush mounted knob to take up an equivalent position. If you use components other than those in the original set, you will have to watch these points most carefully. See that the spindles line-up vertically, and are symmetrical in a horizontal plane with the speaker grille. In most cases, the flat on the volume control shaft will need to be enlarged, before mounting, to accommodate the knob. Don't forget this point!

The 1R5 mounts just to the left of the tuning gang, with the first I.F. transformer behind it, and then the 1T4 I.F. amplifier valve. Along the rear of the chassis comes the second I.F. transformer, the 1S5 audio stage and the 3V4 output.

When mounting the sockets make sure to locate them in the position which will give the shortest leads. Mounting arrangements for the midget I.F. transformers vary with different types and you will also have to give this matter careful thought. Make sure that the lugs clear the chassis and, if necessary, enlarge the holes with a small round file.

SPEAKERS

There are at least two 3in. loud-speakers available on the market and either can be made to fit on the chassis. One type carries the output transformer and will be mounted as illustrated. With the other type, it may be necessary to mount the transformer separately over the vacant space at the end of the chassis near the 3V4 output valve. Do not forget the point mentioned earlier about earthing the voice coil.

The power socket mounts on an upturned section of the chassis just behind the gang condenser. There is very little space to spare for the socket and it is absolutely essential to use a compact wiper type. When fitting the receiver it is necessary to mount and wire this socket

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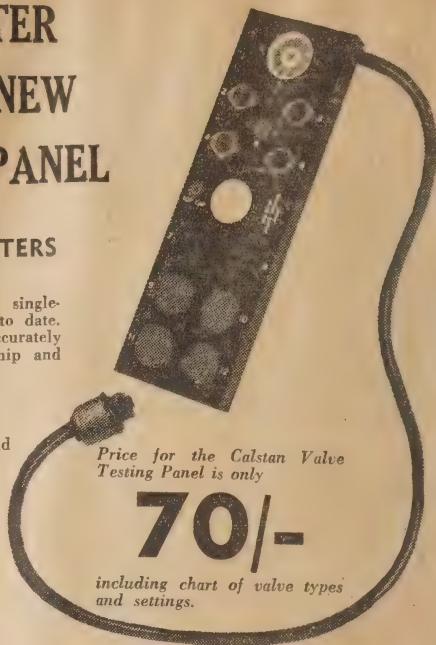
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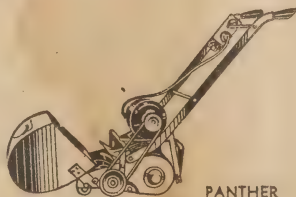
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completely, before the gang condenser is installed.

In the original receiver the push-button "off-on" switch is alongside the power socket at the rear of the set. It is likely that the final chassis will have the push-button below the power socket, allowing the socket to be mounted centrally on the up-turned strip with a couple of bolts to brace it to the rear plate of the gang. A fair degree of force is necessary to insert and remove the octal plug, but we did not appreciate the point fully until after the experimental chassis had been cut and bent.

FLUSH MOUNTING

Beneath the chassis it is most important to keep all wiring and components flush with the rear flange, since the B battery slides in through the cut-out, beneath the wiring and components. Use midget resistors and the smallest available mica condensers and so arrange them that nothing protrudes lower than 5-8in. below the surface of the chassis. There is actually enough room for all the components if they are installed in orderly fashion, and, to assist in this regard, we have coded the underneath photograph of the chassis to show the position of components.

An 8 mfd condenser is desirable on the B-plus line to prevent loss of power through the back-bias resistor, and under conditions when the high tension battery is in poor shape. The same condenser serves as a filter for a-c operation, and you will find that there is just room for a small tubular type in the position shown.

"A" BATTERIES

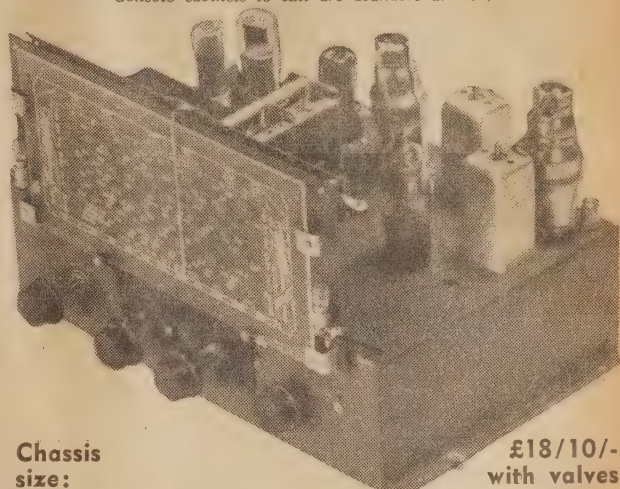
The A battery space is beneath the chassis at the opposite end to the B batteries. You will find that you can instal two of the smaller 1.5 volt cells in the space beneath the chassis and they can be held in place easily by a small metal partition. This was soldered in the original set to the earthed cover of the volume control. A pair of contact fingers were also attached to the cover to bear against the bottom end of the cells when pushed into place. This establishes the "A-minus" connection. The "A-plus" connection is best affected by a scrap of spring brass recessed and screwed to the bottom edge of the cabinet. If you arrange things carefully and bend the strip into a shallow arc, you will find that firm contact is made to the cells when the lid is screwed in place.

An interesting alternative is to arrange the space to take a single large 1.5 volt cell instead of the two smaller ones. You will find that a single large cell is too long to fit completely beneath the chassis, but the overall length is just about sufficient to bring it flush with the outside of the rear lid. It would thus be possible to fit the rear lid with a slide or clip covering a circular hole just large enough to admit the A battery. By sliding the clip, you

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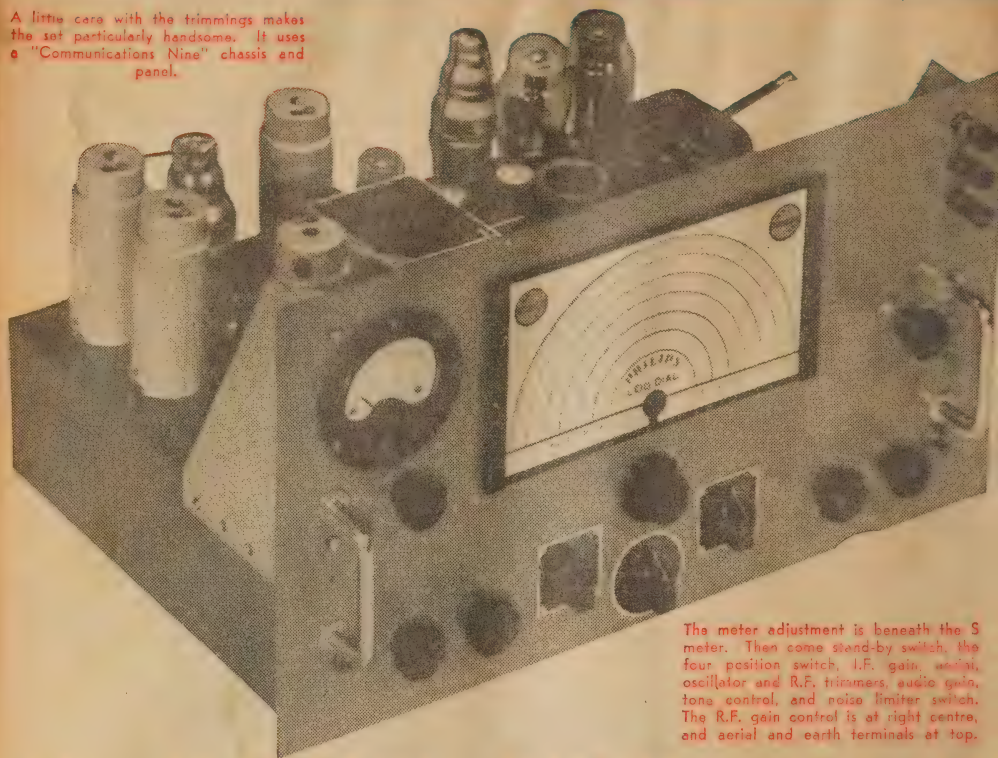
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Continued on Page 68)

A little care with the trimmings makes the set particularly handsome. It uses a "Communications Nine" chassis and panel.



The meter adjustment is beneath the S meter. Then come stand-by switch, the four position switch, I.F. gain, mixer, oscillator and R.F. trimmers, audio gain, tone control, and noise limiter switch. The R.F. gain control is at right centre, and aerial and earth terminals at top.

AN 11-VALVE SHORT WAVE

This is very nearly an ideal set for general or short wave listening whether the bandspread feature is used for amateur work on a larger gang fitted for wide coverage. Despite its high performance, it is well within the constructional ability of the average set builder.

IN the Short-Wave Handbook for 1947, we described the "2JU Straight Eight" shortwave set, a set intended to extract the maximum usefulness from eight valves, and suitable for either amateur work or straight shortwave listening.

One of the set's features was the use of a chassis ready punched for the addition of extra features and general circuit expansion. Ever since it was described, we have been intending to run the circuit again, adding these features so that the finished receiver would merit the term "de-luxe" in its own right.

Actually we have been operating the set in its expanded form for quite a while now, with the greatest of success. It has proved itself very stable, exceptionally sensitive, and highly selective. At 14mc. a signal of 1 microvolt will read about 1.5 points on the meter.

It is a pleasure to operate, and would only be excelled or equalled by the very best communication receivers, which, if obtainable, would be very costly.

As you will see, there are 11 valves in the finished job. Three of these are underneath the tuning gang, as will be remembered from your Short-Wave Handbook. This brings their sockets right up against the plug-in coil sockets and respective trimming condensers, thus keeping leads as short as possible.

It also allows the leads from the band-spread condenser to run by a

very short path through the base to the coil sockets. This band-spread condenser, by the way, is made by cutting down the plates of a broadcast tuning gang to three, and reshaping these to a more or less semi-circular shape of about $\frac{1}{4}$ inch radius. This will make a three-gang condenser of about 35 mmf/s per section, with no coupling problems, and much more rigid and compact than by ganging three midgets. The latter scheme, however, can be used if you prefer it. The oscillator section is nearest the tuning dial, the mixer section, and the RF section at the rear. The gang we used was taken from a No. 11 Army set as were the intermediates and most of the other small parts.

If the plates are made of exact semi-circular with this condenser they will not mesh properly, because of the shape of the plates.

by John Moyle

This crowds the calibration a little towards the low frequency end of each band, but it is quite acceptable because of the very great bandspread available in any case.

You can remove the plates from the rotor for shaping, and re-insert them again without much trouble. If you double-space them when putting them back, they will be easier to handle. There is no need to touch the fixed plates. As this condenser tunes only a small portion of each coil, its minimum capacity isn't a worry.

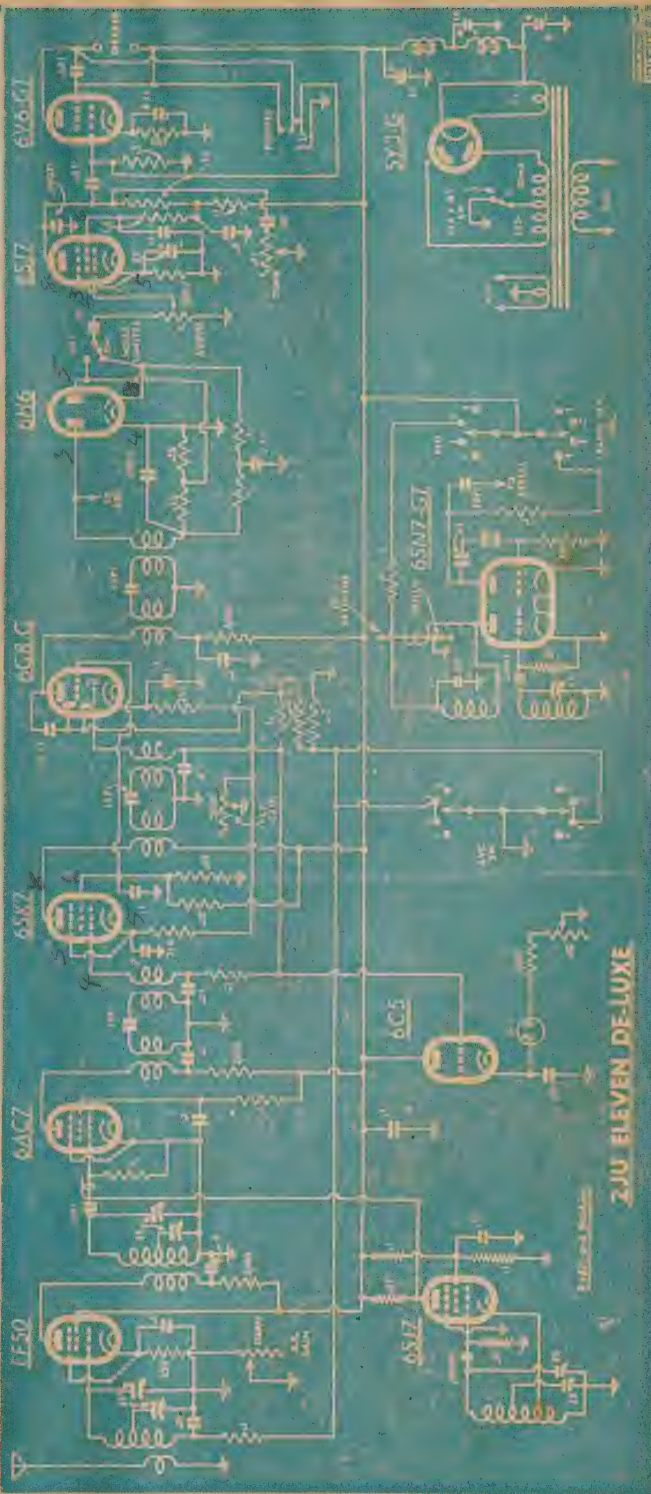
It is essential to shield the oscillator and mixer coils as we have done by building a dual-compartment shield. This will prevent inductive coupling, and still allow you to get at the coils. The aerial coil is left unshielded, as will be seen.

There is not much more to say about this part of the set as the circuit tells the story. Take great pains to see that all the tuning end and its components are mounted as rigidly as possible, all leads in the tuning circuits being made with heavy gauge wire. When the coils themselves are wound, and the turns correctly adjusted, give them a coat of oil dope so that the windings cannot slip about and alter your calibrations.

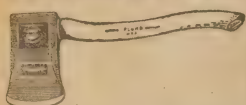
The IF channel is much the same as in the original set except that three more intermediates have been added, so that each stage has two, connected "back to back." This doubling up on the IF tuned circuits gives a much improved selectivity curve. The coupling condensers between the tops of the respective windings are necessary, otherwise the mutual loading of the two circuits concerned will make lining up almost impossible. A maximum coupling value of 25 mmf's may be used, although your peaks will be sharper with smaller condensers. They may reduce the IF gain a little, but it is high enough and to spare, so that this isn't important. After all, the main function of the IF channel is to provide selectivity.

The IF's we used are not highly selective, but with five of them in circuit (we dropped the last one as you will notice from the photos, as being not essential; and to give us a socket hole for the "S" meter valve) there is an attenuation of about 30 db. at 5kc. away from the signal, and about 60 or so db. at 10kc. If you used extra sharp IF's you will do even better than this, although it is doubtful whether extra selectivity would be worth while. The figures are given purely as a rough guide, because selectivity curves of IF trans-

Although six I.F.'s. are shown, the last
may be omitted with out great selectivity
Various features are discussed in
the text



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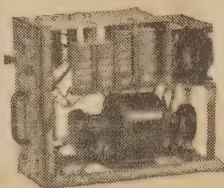
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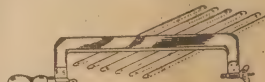
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formers vary greatly from one make to another. The best idea is to use as many as you require to get the results you want. Our figures mean that an S8 signal becomes about S4 5kc. away, and down to virtual zero at 10kc. This is allowing a 6 db. change per S point.

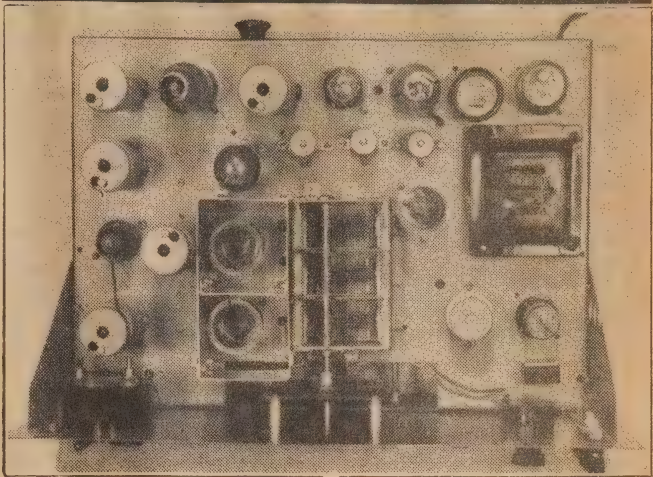
When lining up your IF channel, take the very greatest care. You can use the S meter indication quite well, although best results will be had with an oscillator and output meter. Go over the circuits several times, as each adjustment you make will affect its associated circuits. Poor lining will result in asymmetrical tuning and increase your bandwidth. If you find the IF transformers peak broadly, reduce the coupling condenser values. These may be as low as 5 mmfds. The exact value will not greatly affect selectivity, within the limits we have quoted.

A.V.C. SYSTEM

The AVC system is arranged so that the RF stage gets only partial control, and the IF's full control. This allows best RF sensitivity at all times.

The S meter is a big improvement over the original, but needs an extra valve. It is really a VT voltmeter reading the AVC voltage developed in the AVC system. The meter reads the cathode current of the triode valve, which varies with the voltage applied to its grid. In operation, the adjusting potentiometer is set so that the meter reads full scale with no signal. The carrier strength will then

UNDER-CHASSIS OF 11-VALVE SET



The R.F. mixer, and oscillator valves are mounted on a bracket underneath the tuning gang. The 6J5 is immediately behind the coil can. Note the B.F.O. coil and crystal behind the panel at right. The variable condenser for B.F.O. note variation may be mounted here, but is not shown. All other components should be easily recognisable.

determine the extent to which the valve current is reduced, and with it, the meter reading.

We used a standard signal strength meter of 0-1 mills, having a reverse reading scale of 10 divisions, each

marked to represent a 6 db. variation. It so happens that the AVC characteristics of the receiver will give this variation almost exactly, and on an almost linear scale. This was checked with a signal generator

TELCON H.F. CABLES

TELCON DESIGNED H.F. CABLES ARE THE BASIS OF WORLD STANDARDS

For Design Engineer or Experimenter TELCON offers a complete range of Coaxial Cables and Flexible Twin Transmission Lines. All cables utilise Telcothene (Polythene) as the Dielectric Material.

A RANGE OF MATCHED CONNECTORS IS AVAILABLE FOR ALL TELCON COAXIAL CABLES

| Type | Code No. | Coaxial | | | | | | | Twin Parallel-Unscreened | | |
|------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------------------------|----------------------------------|---------------------------|
| | | PT1M | PT5M | PT9M | PT11M | PT29M | PT39M | AS42M | BA20AP | K24 | K25 |
| Impedance | | 75 | 50 | 50 | 75 | 75 | 75 | 75 | 150 | 300 | |
| Attenuation | 1 M/c. | .41 | .22 | .6 | .31 | .16 | .28 | .16 | .5 | .3 | .15 |
| db. per | 10 M/c. | 1.3 | .72 | 2.0 | 1.0 | .52 | .9 | .55 | 1.5 | .9 | .4 |
| 100 feet | 100 M/c. | 4.2 | 2.3 | 6.5 | 3.4 | 1.7 | 2.9 | 1.8 | 5 | 3 | 1.35 |
| Loading | 1 M/c. | 1.5 | 5 | .5 | 3.5 | 7 | 4 | 5 | 1 | 3 | 4.3 |
| Kw. | 10 M/c. | .5 | 1.5 | .2 | 1.0 | 2.2 | 1.2 | 1.5 | .4 | 1 | 1.6 |
| In Air | 100 M/c. | .15 | .5 | .05 | .35 | .7 | .4 | .5 | .1 | .3 | .5 |
| Capacity uuF/ft. | | 24.5 | 32 | 29 | 21.5 | 21.5 | 22 | 19 | 18 | 10.6 | 4.6 |
| Diameter; inches | | $\frac{1}{4}$ | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{3}{4}$ | $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{1}{4} \times \frac{1}{8}$ | $\frac{1}{4} \times \frac{1}{8}$ | $7-16 \times \frac{1}{8}$ |
| PRICE per yd. | | 1/6 | 2/9 | 1/3 | 1/11 | 3/3 | 2/3 | 2/6 | 6d | 6d | 8d |

All Prices Subject to Change without notice. For further particulars call or write.

A.W.A. TELCON PTY. LTD., 47 YORK ST. SYDNEY

Rep.: AMALGAMATED WIRELESS A/SIA LTD., 163 QUEEN STREET, MELBOURNE

BARGAIN RELEASES



P.M.G.

Adjustable Morse Keys

We have made another purchase of these brand new, genuine P.M.G. Adjustable Morse Keys and we are now able to sell them at the ridiculously low price of 10/- each.

P.M.G. MORSE KEY 10/- ea.

(Without Headphones).

P.M.G. MORSE KEY. With brand new Stromberg-Carlson

headphones **19/6**
Postage 1/6 extra.



REFLECTOR GUNSIGHTS

Ex-Air Force. Containing best quality condenser lenses and adjustable reflector. Parts can be used for many purposes. **39/6 ea.**

Postage 2/6 extra.

COMPONENTS INCLUDE THESE VALUABLE LENSES.



1 No. 1 Diam. 3 5-8 Foc. Len. 10in.
2 No. 2 Diam. 3 3/4 Hollow Ground. No. 3
3 Diam. 3 1/4 Foc. Length 4 1/2in +
4 No. 4 Diam. 2 3-8 Foc. Length 6 1/2in.
5 + No. 5 Diam. 1 1-8 No. 6 Diam.
6 1 1-8 Amber Coloured ordinary.

SUPER TOOL OFFER

BEST QUALITY SPANNERS

- I Van Chrome 1/2 x 3/16 Spanner Whit
- I Van Chrome 5/16 x 1/4 Spanner Whit
- I Van Chrome 3/8 x 5/16 Spanner Whit
- I Steel . . . 3/8 x 5/16
- I Steel . . . 3/8 x 1/2
- I Steel . . . 1/2 x 7/16
- I Steel . . . 5/8 x 1/2
- I Van Chrome 5/8 x 9/16 Spanner S.A.E.
- I Van Chrome 7/16 x 1/2 Spanner S.A.E.
- I Magneto Spanner 2BA x 4BA
- I Magneto Spanner 6BA x 6BA
- I Pair Pliers
- I Ball Pein Hammer
- I Metal Toolbox, 3 1/2" x 7" x 15" long.

SPECIAL PRICE . . . £27/6 THE LOT.
Postage 5/6; Interstate 6/6.



**Genuine P.M.G.
Morse Key,
with Light**

Complete with Stael Carrying Box, 8in. x 8 1/2 x 7. Worth at least £6/10/-.
With Carrying strap.

Our Price . . . 7/6 ea.

The Carrying Case, which is complete with shoulder strap, alone is worth the money, or together with spotlight 25/-.
Postage NSW 3/-; Interstate 5/6.

OILED JAPARA RAINCOATS

ANTI-GAS CAPES

Guaranteed brand spanking new, all sizes. Originally cost the Army 35/- each.

OUR PRICE,

10/- ea.

Post, N.S.W., 2/6.
Interstate, 3/6.

We have a large stock of these raincoats and they are selling very fast, so please order early.



Carpenters'

CLAW HAMMERS

Ex-Army, Brand New. 24oz.

each **5/11**

Postage, N.S.W., 1/3;

Interstate, 2/-.

BLACK OILSKIN SOUTHWESTERS

Ex-Navy, Brand New, original price 8/6. These are super quality. Out they go.

EACH . 3/6

Post, 6d. NSW; Interstate, 9d.



MILITARY OVERCOATS



BRAND NEW, ALL SIZES. For warmth and hard wear these coats are unexcelled. Worth at least £5.

OUT THEY GO . 45/-

Post N.S.W., 2/-; Interstate 3/6.

4 1/2lb. KEENCUT AXES

Complete with handle.

Brand new. **PRICE . . . 18/6**

Post, N.S.W., 1/6; Interstate, 2/-.

GREASE GUN



ZERO PUSH-TYPE GREASE GUNS, EX-ARMY.

3oz., slightly used, perfect order, 9/6 each; 5oz., slightly used, perfect order, 12/6 each; 10oz., slightly used, perfect order, 15/- each. Postage 1/6 extra.

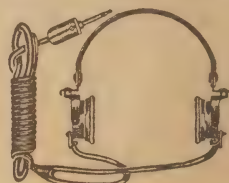


Spot Light

Ideal for fishing, hunting, shooting. Brand new. Original cost £2/15/- each.

Our Price 17/6

or together with Morse Key, Light and Case, 25/-.
Complete with Stand. Freight 3/-.



HEADPHONES

Brand new, S.T.C. and Stromberg-Carlson. We have just made another purchase of these brand new 'phones, complete with cord and plug, and we are now able to sell them at the ridiculously low figure — 130 ohms impedance **9/6**

Postage 1/6 extra.

2000 ohms impedance . . . **£1**

Suitable for crystal sets.

PLEASE NOTE: These 'phones are brand new, ex-Army, and not military rejects.

STIRRUP PUMPS

Brand new American Stirrup Pumps, original cost 27/6. These are in perfect condition. Out they go, each **5/6**

Complete with 15ft. of hose.

Interstate, 3/6.

Postage, N.S.W., 2/-.



No. C.O.D.

DEITCH BROS.

Please note our new address:
70 OXFORD ST., SYDNEY

by varying input voltages, and not ing the meter variation for each setting. It required a total variation of 55 db. to bring about a reading of S9 with a maximum error over the scale of about 2 db. round about the centre.

If the 1 meg. resistor in the AVC load circuit is replaced by a potentiometer, and the 6J5G fed to it through a .1 meg. isolating resistor, the scale reading of the meter can be compressed as desired to adjust the number of db. change per division, varying from the maximum possible deflection to a very small value developed by the .25 resistor used for the EF50 grid return. In general, however, your set should duplicate our results pretty well. Your S meter will then be able to give you worthwhile information on variations in signal strength, although at this stage we don't wish to start a controversy on the value of S meter reports!

The noise limiter is a worth-while addition, and extremely simple to wire up. It isn't as effective as on a broad-selectivity set, but is very use-

COIL DATA

- 3.5 Mc.**
R.F. coil: Primary 10T closewound; secondary 40T closewound, tap 26T.
Mixer coil: Primary 14T closewound; secondary 40T closewound, tap 26T.
Oscillator coil: 33T closewound tap, 22T, cathode tap 11T.
- 7 Mc.**
R.F. coil: Primary 8T closewound; secondary 23T spaced to 1/4in., tap 8T.
Mixer coil: Primary 12T closewound; secondary 23T spaced to 1/4in., tap 8T.
Oscillator coil: 19T spaced to 1/2in., tap 7T, cathode tap 6T.
- 14 Mc.**
R.F. coil: Primary 5T closewound; secondary 6T spaced to 1/2in., tap 3T.
Mixer coil: Primary 6T closewound; secondary 12T spaced to 1/4in., tap 3T.
Oscillator coil: 10T spaced to 1/2in., tap 3T, cathode tap 2 1/2T.
- 28 Mc.**
R.F. coil: Primary 3T closewound; secondary 6T spaced to 1/2in., tap 1 1/2T.
Mixer coil: Same as the R.F. coil.
Oscillator coil: 5T spaced to 1/2in., tap 1 1/2T, cathode tap 1 2-3T.
- 27 Mc.**
Same coils as for 28 Mc. except that trimmers are set to different values. All secondary windings are wound with 18 s.w.g. enamelled wire. All primary windings are wound with .33 s.w.g. d.s.c. wire. Primary windings are spaced 1/4in. from secondary windings in all cases. All coils are wound on 1/2in. dia. coil formers.

ful on many types of ignition, noise, &c. You can experiment with the .25 meg. resistors which give the system its balance, and an improvement can often be brought about by using different values, provided the total of the two resistors is close to .5 megs. This is about the best noise limiter we have used, particularly because there is so little to it. It follows carrier strength variation, and has little effect on either signal strength or quality.

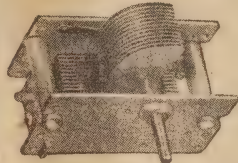
One of the biggest disadvantages of a plug-in coil set is the need to line up the band set against dial calibration each time the coils are changed. You will see that the BFO is a dual triode, with one section wired as a Pierce crystal oscillator using a crystal of exactly 3.5 megs. The AVC, BFO and this oscillator

Homecrafts

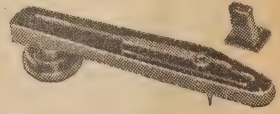
PTY. LTD.

DON'T MISS THESE

MONEY SAVING BARGAINS



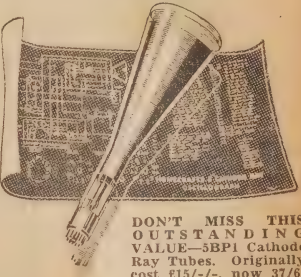
Standard Type Single Gang Condensers. As illustrated, 10/11.
2 Gang Ditto 12/11



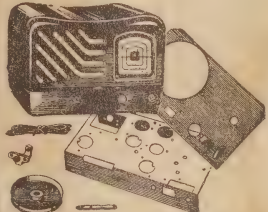
English Crystal Pickups as illustrated 43/11.



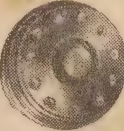
Telephones with up to 10 mile Range. Ideal for extension or inter-communication, without rental. As illustrated, 2 Guineas Complete, plus Batteries, 5/-.



DON'T MISS THIS OUTSTANDING VALUE—3BP1 Cathode Ray Tubes. Originally cost £15/-, now 37/6, plus Sales Tax. Circuit Diagram to Build Oscillograph, 1/6. 2 x 2 High Vacuum Rectifier, 15/- plus Sales Tax. Type 884 Gas Triode 29/6 plus Sales Tax.



Set Builders, don't miss this bargain. Bakelite Cabinet 5-valve Chassis, Baffle Panel and Dial Assembly, as illustrated. Only 45/- complete.

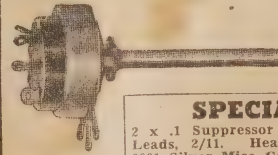


Bakelite Moulded Socket for 5BP1 Tubes (as illustrated).



Wire Wound Resistors. 5 watt Type 100 to 2000 ohms. 1/2. 5 watt Type 2100 to 5000 ohms, 1/4. 10 x 20 watt Type 100 to 1000 ohms, 4/2. 1100 to 15,000 ohms, 4/11.

English Dagole 3 meg. Potentiometers with Switch. With Single Pole Switch, 8/3. With Double Pole Switch, 10/6.



SPECIAL SNAPS!

2 x 1 Suppressor Condenser in Case with Leads, 2/11. Headphone Cords, 1/11 pair. 0001 Silver Mica Condensers, 3/6 dozen. Iron Core Permatune Coils. Aerial, RF & Oscillator, 4/11. 12 volt Non-Synchronous Vibrators. Cut to loose Base Only. Cut to 4/11.

6K7G, Equivalent 6U7G, Valves. Electrically perfect, loose Base Only. Cut to 4/11.



Block Condenser Socket for 5BP1 Tubes (as illustrated).

- Block Condenser Bargains:**
6000v. test, only
1 mfd. 450v. 3/11
Wkg. 2/6
4 mfd. 450v. wkg. 5/11
25 1000v. Wkg. 3/6
2 6000v. Test 5/-
1 1500v. Wkg. 2/11
1 mfd. 800v. Test 3/11
2 mfd. 800v. Test 4/3
5 500v. Wkg. 2/6
2 8000v. Wkg. 5/11

290 LONSDALE ST. MELBOURNE, C4311

Also at Ballarat, Geelong, Hobart, L'ceston, N'cstle, Sydney.

(Continued on Page 83)

GENUINE

RADIO BARGAINS



CLOCKS

B/C608A. As used by the U.S. Army. Will run for 24 hours with one winding. Illuminated hand will suit photographic work, etc. Can also be used to work relays.

Our special price ... 25/-

PHONE JACKS

Closed circuit type, made in U.S.A.

Our price ... 2/-

SWITCHES

Single pole toggle switches, with luminous bead on toggle. Suitable for test equipment. Panel mounting type.

Our price ... 1/6

HEADPHONE CORDS

Brand new and complete with phone plug. A real bargain.

Our price ... 2/6

MICROPHONE CORDS

All in perfect condition, each one complete with microphone plug, 2 pin socket and "press to talk" switch.

Excellent value ... 2/9



BENDIX REMOTE CONTROL

Type BC434A. Included in this unit are: Tuning meter, dual carbon pot, rheostat, excellent vernier tuning dial, 2 Oak type switches, phone jacks.

Brand new ... 22/6

Second hand, but in good condition, ... 17/6

MICROPHONE ADAPTORS

M299 Unit, employs 5 good quality resistors up to 2 watts, a 150 mfd. 50 volt electrolytic and a .1 condenser, also a section of a Jones 6 pin plug.

Our price ... 3/6

NEW RELEASES

EXTENSION SPEAKER

These units are made by Kingsley and are fitted into a handsome metal case, in a variety of colours, such as: Gold, ivory, walnut, etc. Equipped with the latest type Kingsley 6" speaker, switch and flex.

Our price ... £2/18/6

MIDGET DUAL WAVE KIT

This is a complete Kingsley unit which measures only 2 x 3 x 1 1/2. Covers 16 to 50 metres SW and 550 to 1600 kc Broadcast.

Our price ... £1/17/0

ROBLAN MIDGET 3 GANG CONDENSER

This condenser is the ideal job for midget portables and car radios, etc., the size being: 3 x 1 1/2 x 2 1/4.

Our price ... 25/-

FN MIDGET 2 GANG CONDENSER

Specially made for the tiny set. Results are excellent. Dimensions 2 x 1 1/2 x 1.

Our price ... 19/3

L. R. INDICATORS

Type 1/101C. Twin needle deflector meters.

Our price ... 15/-

JACK BOXES

Type BC366. Each unit contains 2 phone jacks, 1 pot and 5 position Oak type switch with metal knurled knobs. Size of box 3 1/2 x 2 1/4 x 4 1/2.

A Bargain at ... 5/-

RADIO CONTROL BOXES

BC732A. Each unit contains a 6 position rotary type SP switch, a Bradley pot, a toggle switch, a phone jack. Housed in black crackle metal case 2 x 3 x 2 1/2.

Excellent value ... 6/3

BC451A. Each unit contains: a 4 position rotary switch, a 3 position rotary switch, one push button switch, two toggle switches SP, one microphone jack, one phone jack, one two pin socket and many other parts. In black crackle case. Size 4 x 2 1/2 x 3. Our price ... 7/6



INTERPHONE AMPLIFIER

BC/212/D. Uses two 6C5 metal tubes in handsome metal case, size 5 x 5 x 2 1/2. Incorporates input and output transformers.

With valves ... 37/6

Less valves ... 20/-

BC347. Uses one 6F6G valve and has an input and output transformer built into metal case. Overall dimensions 5 1/2 x 3 1/2 x 2 1/4.

With valves ... 22/6

Less valves ... 12/6

MICROPHONE AMPLIFIER

BC216A. Uses one 39 and one 6F7 valve and is a transformer coupled amplifier with volume control. Overall dimensions 8 x 6 1/2 x 2 1/2.

With valves ... 39/6

Less valves ... 20/-



TELEPHONE REPEATER

EE/99/T3. This unit uses two IN5GT valves and two 3Q5GT valves. Has 4 rotary type switches, two pots, 17 excellent H.D. terminals, 2 toggle switches and many transformers. Also a compact 12 volt vibrator power pack with all necessary filtering.

A bargain at ... £5



MOTOR SPARES LTD.

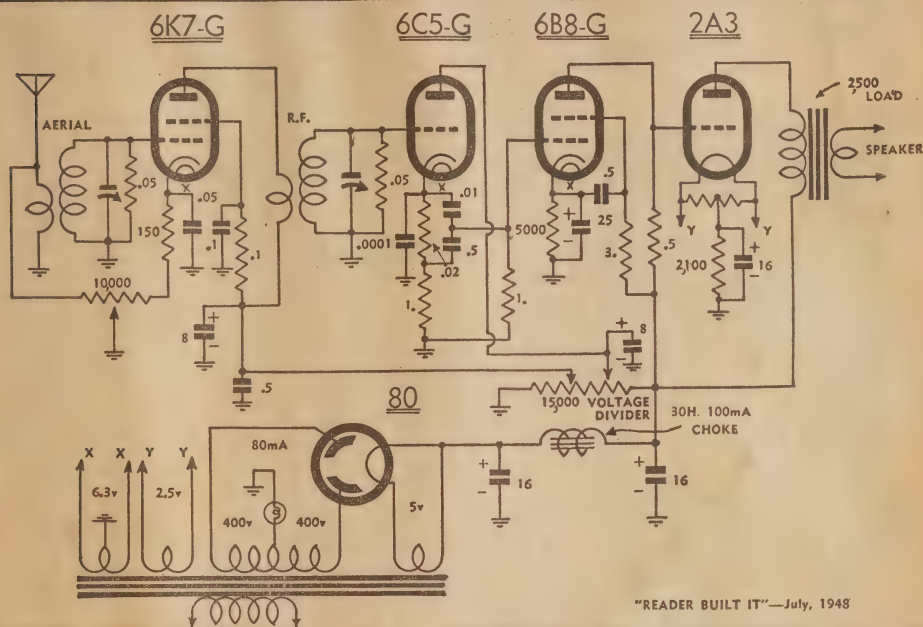
547 ELIZABETH ST. MELBOURNE.



A READER BUILT IT!

Gadgets and circuits which we have not actually tried out, but published for the general interest of beginners and experimenters.

A SIMPLE DIRECT-COUPLED T.R.F. SET



"READER BUILT IT"—July, 1948

Despite much talk of superhets with variable selectivity, many enthusiasts retain their preference for simple TRF quality receivers. The circuit which forms the basis of this month's "Reader Built It" feature comes from Mr. William Darragh, of 191 Fitzroy-street, St. Kilda, Melbourne. The circuit provides for a single RF amplifier stage and a direct coupled audio system.

THE gain and selectivity possible from such a simple tuner is, of course, very limited and there would be locations in which it would not be possible to receive all local programmes cleanly. However, very good results are achieved in favorable areas or if the owner is interested only in the stronger stations. Describing the circuit, Mr. Darragh points out that the RF stage is quite conventional, the gain being controlled by means of a potentiometer which simultaneously varies the bias on the valve and shorts the aerial circuit. A resistor of .05 megohm is shown dotted across each tuned circuit. This was found, in practice, to improve the high frequency response without widening the band width to the extent of causing adjacent station interference in the particular location.

which is conventional except for a small discriminating network in the cathode circuit. The purpose of this is to boost the upper treble and to compensate for the slight loss occasioned by the .0001 mfd RF cathode bypass.

The 6B8 audio amplifier was chosen because it happened to be the only suitable type on hand. Its operating constants are selected to ensure the correct balance of voltage and current in the 2A3 circuit which is direct-coupled to it.

It is not wise to substitute any valve for the 6B8—except the equivalent 6B7 or 2B7—without redesigning the circuit or at least checking to see that correct operating conditions are maintained for 2A3. By the same token, the 6A3 is the only direct replacement for the 2A3, other types possibly requiring different circuit constants.

Mr. Darragh says that the amplifier section has shown a laboratory checked response of from 20 to 20,000 cps within 2 decibels. "In my opinion, it equals any other quality receiver for fidelity. I travelled through USA with the RAAF and failed even there to hear its equal."

At present he is using the receiver to drive a 12in. permagnetic speaker on a 6ft. square baffle and "the results have to be heard to be believed." His other comments are as follows:

"Some readers may not fancy the RF gain control, as it may introduce distortion on increased bias settings. In that case, the stage could be operated at full gain and a 1 meg. potentiometer used to control the audio gain before the 6B8 grid. The RF stage is quite stable with this arrangement."

"It may also be advisable to utilise a 5000 ohm adjustable bias resistor on the 2A3, to allow for adjustment due to variation of voltage and resistor values from the original circuit. The resistor is adjusted till the 2A3 pulls its rated 60 mA. I used 2.8 mfd 600v. condensers in parallel to obtain 16mfd for filtering, and the choke should be in the vicinity of 200 ohms to eliminate undesirable voltage drop."



Be independent of the family radio to bring you the test cricket. Keep up to date with your own private set—get the latest scores just when you want them. Build your own Aegis personal portable NOW—or obtain the Special Offer kitset priced at only 7 gns.

The AEGIS Personal Portable

To rival in performance and reliability the other AEGIS models is the AEGIS PERSONAL PORTABLE. Weighs only 4½ lbs., and the dimensions are 4" x 4½" x 9". Its simplified design renders construction easy—and the chassis is already drilled for conversion to a 5 valve job. The complete additional Kit includes A.R.T.S. & P. Licence.

More Features

- Leatherette-covered wooden case—slide-back for easy battery changing.
- Self-contained Loop Aerial.
- Adjustable Plastic Strap.
- Midget 2-gang by A.W.A. Radio-tron Valves.
- 3" Rola Speaker.
- Ever-ready Minimax Batteries.
- Ducon Condensers, etc.

SPECIAL KITSET—only 7 gns.

For the amateur who wishes to construct a really inexpensive set for normal reception on the broadcast band the obvious choice is this 3 valve AEGIS Kitset at the sensationally low price—7gns.

For further particulars:—



Brisbane, Toowoomba, Warwick, Bundaberg, Rockhampton, Townsville, Cairns.



360 Post Office Place, Melbourne.



116-118 Clarence Street, Sydney. Telegrams Jonmar, Sydney. BW3109.

Building the Multi-Talkie Set

(Continued from Page 59)

could change the A battery in a few seconds, without removing the rear lid at all. However, this is a mechanical detail, which we can safely leave to the ingenuity of individual constructors.

There is hardly need to stress the need for precision in wiring a receiver of this type. The socket contacts are small and close together, and there is simply no room for large blobs of solder, "whiskers" of wire and daubs of flux. We began by bending all socket contacts outward and clipping them off to leave just enough metal to receive a small blob of solder. The sockets were then bolted in place and the filament circuit installed.

HOOKUP WIRE

Plastic-covered hookup wire will give a very neat job. Trim the insulation with a razor blade or sharp knife, cut the leads to exact length and tin before installing them. The same care is necessary when it comes to wiring the IF transformers, where the use of excess heat or solder can easily cause a short-circuit, through to the chassis. The job is made ever so much easier if you have a small 40-watt iron, but otherwise it will be desirable to file the tip of your iron to a slender diamond-shaped point to get into the difficult places. By now you should have a general idea of what is required in the wiring and the rest is very largely up to you.

Now a couple of points about installation in the cabinet. It is not clear at this stage whether manufacturers will make cabinets available with the knob holes already cut, but this appears to be the logical step, particularly as the holes are large tapered cut-outs, to receive the flush knobs. As we mentioned earlier, it is necessary in the original assembly of the chassis to make sure that the control spindles bear the correct relationship to the loudspeaker and its grille.

LOOP MOUNT

The loop aerial mounts in the lid, and there is space for all the smaller types. The only point to watch is that the selected loop tracks with the midget oscillator coil—a type which is wound over a grid resistor. But make sure that the loop aerial is not warped, as the wires may otherwise foul the knobs when the lid is closed. We had a reason, by the way, for mounting our particular loop at an angle in the lid. This position brings the small loading coil opposite a space in the speaker grille. This same loop requires the interconnection of a loading resistor, which is not shown on the circuit, as it is a point recommended only by the individual manufacturer.

One connection of the loop goes to chassis, and this was effected in the original model through the lower

(Continued on Page 60)

TRADE REVIEWS AND RELEASES

MINIATURE ELECTRIC MOTORS

Released under the trade name of "Electrotors," two models of a tiny electric motor are now available on the local market. They will have an immediate appeal to model builders.

Type 240, on the left, is the basic motor and retails in Sydney for 8/6. Type 42 employs the same motor assembly but is housed in a small bakelite case. It is provided with spring contact terminals and retails for 10/9.

The size of these miniature motors can be gauged by comparison with an ordinary wood match, and from the fact that the photograph shows them at approximately full size.

The motors operate from torch cells delivering from 3 to 6 volts and consume less than a flashlamp. They develop a speed of up to 5000 rpm. and are instantly reversible.

Electrotors can be fitted into model boats, cars, trains, aeroplanes, &c., and operate cheaply and with complete safety. Leaflets supplied with them show different methods of installation.

Electrotors are available from toyshops, radio stores, &c. Trade enquiries to D. F. Dodd and Co., 7 King-street, Sydney.



Rola Repair Guide

Produced with the object of helping the radio dealers, serviceman and the general public, the Rola Loudspeaker Repair Guide has just been published by Rola Co. (Aust.) Pty., Ltd.

It lists the complete range of electro and PM types made by the Rola Co., and indicates whether obsolete types can be repaired economically. Where this is impracticable, the list indicates modern loudspeakers which can be used as replacements.

This attractively produced booklet can be obtained from Rola distributors in all States, or direct from Rola Co. (Aust.) Pty. Ltd., The Boulevard, Richmond, Victoria.

NEW ALL-WAVE TUNING UNIT

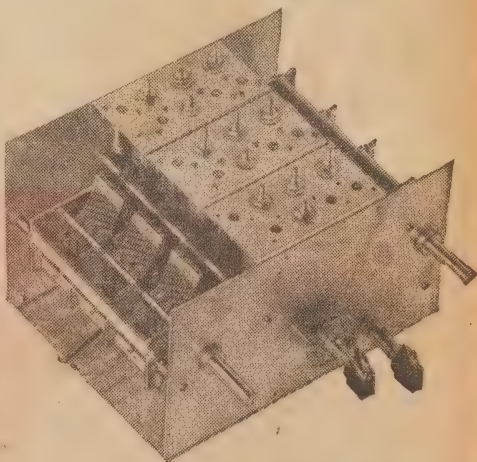
Latest release from the Aegis Manufacturing Company is a de-luxe four band tuning unit, which comes complete with two communications type dials and a calibrated frequency scale. It will have a particular appeal to amateurs and short-wave RX enthusiasts.

The tuning unit, as illustrated on the right, gives complete coverage from 550kc. to 30mc. in four bands. In addition, it provides bandspread for the amateur bands on 3.5, 7, 14, 21 and 30 mc.

It is actually constructed in three sub-sections, containing the coils, switching and trimmers for the aerial, RF and oscillator sections. These are assembled into a U-shaped bracket, which also carries the main tuning and the bandspread gangs.

The sockets for the RF, converter and oscillator valves are mounted beneath one gang and wired to the switch and coils. Flexible leads are brought out for connection to the supply sources and to the IF amplifier channel.

The unit, which measures approximately 8½in. x 5½in. x 7in., therefore constitutes a basic tuning system for a communications type set. It would be mounted on a suitable chassis with controls protruding through the front panel, and in a suitable position to receive the dials and the calibrated frequency scales.



Electrically, the wiring provides for a 6SK7-GT RF amplifier, 6AC7 mixer and 6SK7-GT oscillator. Concentric air trimmers are used throughout and the aerial trimmer is brought out to the front panel with a ½in. shaft. The other trimmer screws and the iron cores are readily accessible for adjustment.

The 6-section "Oak" type switch includes shorting banks for all coils not in use.

We have not yet been able to test the unit, but it strikes a new note and it looks good.

Price Reduced

As from June 15, the retail price of type 1K5-G valves will be reduced to 10/6, plus 2/- excise. The nett cost will thus be 10/6 retail, the price being subject to normal trade discounts.

The 1K5-G valve is a sharp cut-off RF pentode with a 250 volt, .12 amp. filament and a transconductance of approximately 1000 mhos. in the pentode connection. It makes an excellent general purpose triode, with a transconductance of 1700 mhos. and a power output at 180 volts of 100 milliwatts.

Large numbers of these valves were manufactured during the war and the price reduction is intended to encourage their use to clear the surplus stocks.

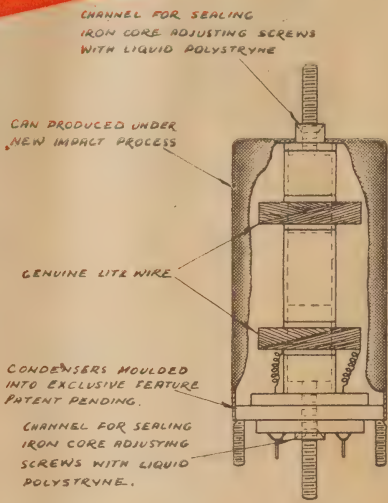


R.C.S. develops 6 new I.F.'s

Patents Pending on DESIGN ADVANCEMENT

The 'new R.C.S. I.F.'s have the amazing new R.C.S. development (over which patents are pending) . . . condensers moulded into the polystyrene base. To enable them to remain constant under all conditions, the condensers are first dried out under infra-red rays thereby expelling moisture and raising the Q. They are then moulded into the polystyrene former base, an exclusive R.C.S. patented feature, where they are beyond the reach of climatic variations. The aluminium cans, too, are now pressed out under a new "impact" process.

**Patented
FEATURE
gives
R. C. S.
I.F.'s
highest
Q**



DRIFT
PREVENTED
BY
CONDENSERS
ACTUALLY
MOULDED
INTO
POLYSTYRENE
BASE

Sealing cavity in former at top and bottom (where iron core screw emerges). Condensers moulded into base. **PRICE 13/- RETAIL**

| R.C.S. I.F. SELECTION CHART | | | | |
|-----------------------------|-------|-------|----------|---------------------|
| TYPE No. | | | GAIN | SELECTIVITY QUALITY |
| STAGES. | | | | |
| 1st | 2nd | 3rd | | |
| IF170 | IF171 | | Standard | Standard Good |
| IF172 | IF171 | | Good | Average Good |
| IF172 | IF173 | | Good | Sharp Average |
| IF170 | IF173 | | Standard | Very Sharp Fair |
| IF174 | IF174 | IF171 | High | Sharp Good |
| IF168 | IF169 | | High | Good Fair |
| (Portable) | | | | |
| IF169 | IF168 | | Standard | Fair Good |
| (A/C Mantle) | | | | |

NEW DEVELOPMENT

This new R.C.S. development will be of major assistance to small manufacturers and amateurs. For the first time, you can tell at a glance the relationships of gain, sensitivity, selectivity and tone quality that you can expect from each of the six sensational new R.C.S. I.F.'s.

Obtainable from your local Radio Retailer

R. C. S. RADIO PTY. LTD.
174 CANTERBURY ROAD, CANTERBURY, N.S.W., AUSTRALIA

Tracer Probe

Prospective constructors of signal tracers will be pleased to know that a special probe housing is now available from the N. Radio and Electronic Co., 265 Millery-road, Cremorne, S.W.

The new probe has a chromium plated handle 4in. long and 1/2 in. diameter, which is sufficient to house a miniature valve and its associated components.

The probe tip is likewise chromium-plated and the insulation at each end is of clear transparent plastic. It would normally be connected to the parent instrument by the length of shielded cable. Supplies of this probe are available only from the manufacturers.

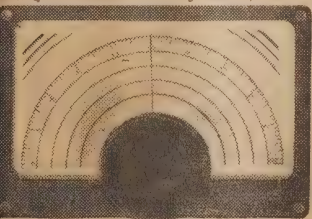


NEW EDDYSTONE INSTRUMENT DIAL

A new Eddystone dial has been released on the Australian market which will find ready application in shortwave receivers and laboratory instruments.

The dial employs a large control knob and a planetary drive, which is normally connected to the condenser shaft at the rear by means of a flexible coupling. A fine pointer traverses a 180 degree scale concentric with the control knob.

The drive mechanism is contained in a 3/4-inch diameter cylinder, which



passes through the front panel of the equipment and is attached to it by two small bolts. The escutcheon plate also bolts to the front panel, so that mounting is a comparatively simple matter.

The escutcheon is finished in a black crackle lacquer and measures 1 1/2 in. x 4 1/2 in. over all. The normal scale is printed on white celluloid, but two other scales are supplied with the dial printed on white card. These have blank spaces for hand notation. The dials are available from all Eddystone distributors. Enquiries to Keith Harris & Co. Pty. Ltd., 51 William-street, Melbourne.

100 WATT P.A. AT MANLY

South Steyne beach, at Manly, Sydney, will have a 100 watt public address amplifier for the next surfing season. Manufactured and installed by Steane's Sound Systems, it is to be largest installation in Australia intended for shark alarm and beach rescue work.

PURCHASED by the Manly Municipal Council, the amplifier is installed in the casualty room of the pavilion, where a microphone is provided for use by the club.

Another microphone is being fitted at the top of the 60ft. pylon or shark tower, so that the lookout man can direct rescue operations with the advantage of a "bird's eye" view.

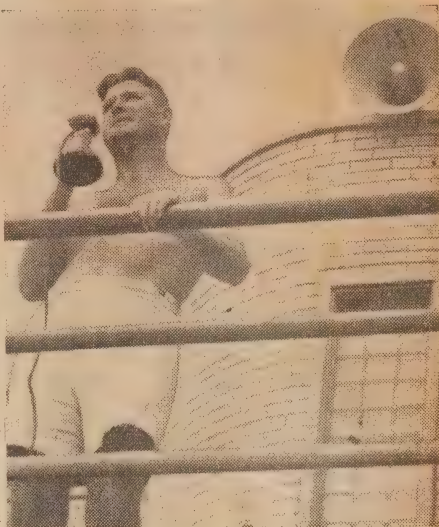
Seven cast aluminium horns are attached to wooden uprights along a beach front of 440 yards, one of these being fitted to a post on the south side 200 yards out.

In addition a special speech projector is secured to the facade of the pavilion, covering a wide azimuth in this area.

During installation tests, which were carried out on half-power, surf skiers reported hearing the announcements clearly several hundreds yards out to sea.

The importance of such a system is apparent as, at the press of a button, it can be used for rescue work, shark warnings and general control of the surfers.

The special loudspeaker units are similar to many supplied to the US Forces who used them for beach landing-operations.



Beach inspector Crumb using the microphone on the parapet of the South Steyne surf pavilion.

Manly Council are to be congratulated upon this modern innovation which should be the forerunner of similar permanent outfits for surf clubs.

Full particulars of the equipment may be obtained from Steane's Sound Systems Pty. Ltd., Sydney.

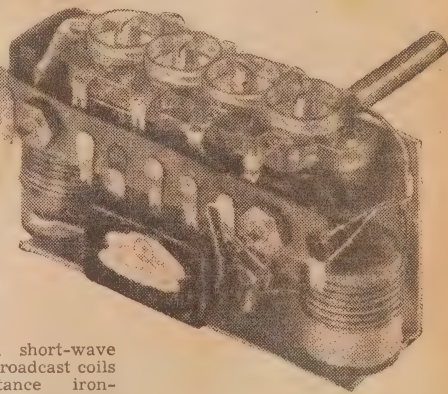
"Q-PLUS" MIDGET D/W UNIT

Latest release from R. W. Steane and Co. Pty. Ltd., is a "Q-Plus" midget dual-wave bracket, especially designed for use with the 1R5 converter valve.

The new bracket is probably the smallest commercial unit of its type so far released. Overall measurements are approximately 3 1/2 in. x 2 1/4 in. x 1 1/2 in., and the construction makes provision for single-hole mounting.

Despite the compact construction, full-sized short-wave coils are included, the broadcast coils being variable-inductance iron-cored types, with special iron-dust impregnation. Trimmers and core adjustments are readily accessible.

Individual units are available through normal distributors. Trade



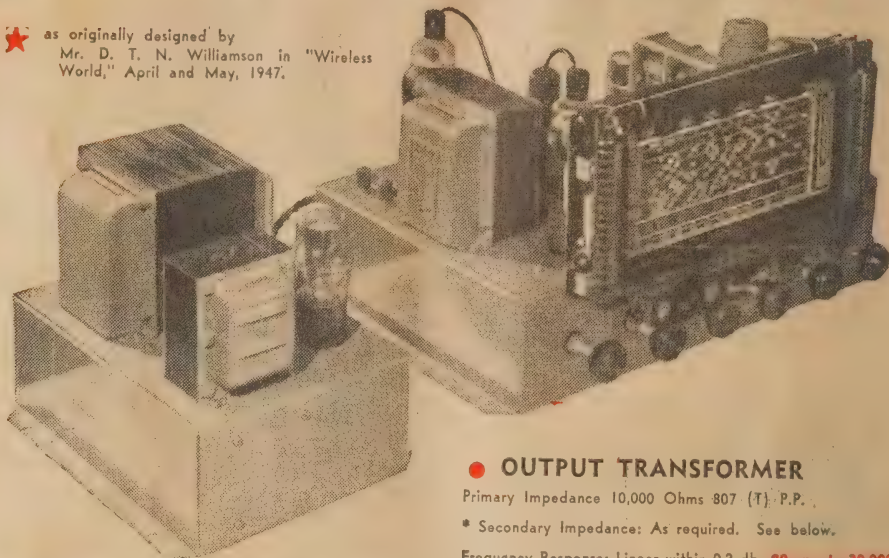
inquiries may be addressed to the manufacturers or to A. J. Phillips Agencies in Sydney, Brisbane and Adelaide.

RED  LINE

MATCHED KITS

for THE NEGATIVE FEEDBACK AMPLIFIER *

★ as originally designed by
Mr. D. T. N. Williamson in "Wireless
World," April and May, 1947.



★ CONDENSER INPUT POWER SUPPLY

| | Type No. | Price |
|-----------------|--------------|----------|
| 1 P/Trans | 20453 | £3 16 1 |
| 1 Choke | 201515 | £1 11 10 |
| 1 Choke | 50825 | £1 7 7 |

CHOKE INPUT POWER SUPPLY

(Radiotronics Circuit A515)

| | | |
|-----------------|--------------|----------|
| 1 P/Trans | 25563 | £4 18 8 |
| 1 Choke | 102512 | £1 16 1 |
| 1 Choke | 201515 | £1 11 10 |
| 1 Choke | 50825 | £1 7 7 |

● OUTPUT TRANSFORMER

Primary Impedance 10,000 Ohms 807 (T) P.P.

* Secondary Impedance: As required. See below.

Frequency Response: Linear within 0.2 db, 20 cps. to 30,000 cps.

Primary Inductance (at low ac flux), not less than 125 Henries.

Leakage Inductance: 17 Millihenries.

Insertion Loss: 0.4 Decibels.

This transformer may be used to obtain a gain reduction of up to 25 db. across 4 Stages in a suitable negative feedback circuit.

* OUTPUT TRANSFORMERS

Price £5/15/2

| | | |
|---------|------------|--------|
| AF8 .. | 8 ohm .. | V/Coil |
| AF15 .. | 15 ohm .. | V/Coil |
| AF10 .. | 500 ohm .. | Line |

or as specified

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A GUARANTEE

OF DEPENDABILITY

TRAINER USES MAMBA TURBO-JET

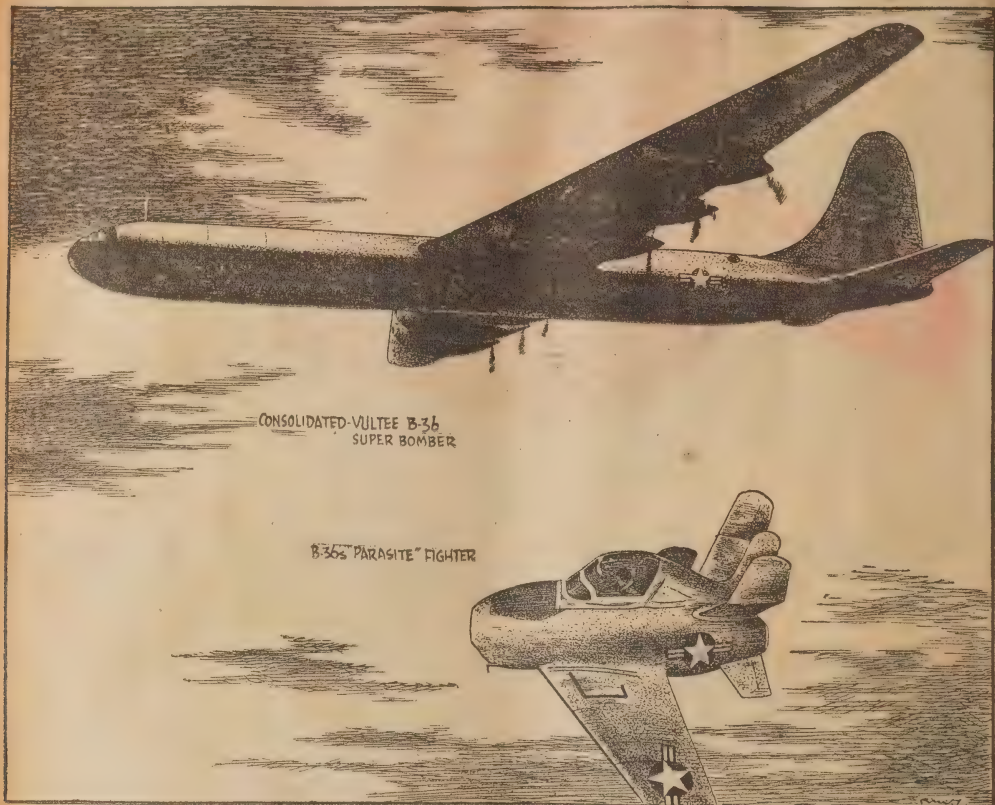


WHEN the Boulton Paul Balliol Royal Air Force trainer made its initial flight recently, the British gas-turbine engines reached yet another stage in their development. The Balliol is powered by an Armstrong Siddeley Mamba turbo-prop engine—a gas-turbine unit driving a propeller—and is the first single-engine airplane of its type to fly. The airframe of the prototype was completed about a year ago, before the engine was

Armstrong Siddeley's chief test pilot Sqd.-Ldr. Price-Owen immediately before flying the Mamba Gas Turbine Engined Balliol. The car bonnet, having a 16 hp engine, is an interesting contrast in size with the nose of the aircraft housing the 1000 hp Mamba, which incidentally weighs only 1000lb. against the car's 3000lb.

ready for installation, and for test purposes a Bristol Mercury piston engine was fitted. In this form, the airplane was called the P.108. With Mr. Lindsay Neale, Boulton Paul's chief test pilot, at the controls, the P.108 gave a remarkable aerobatic performance at last year's Society of British Aircraft Constructors' Display. Mr. Neale says of the Balliol: "It is a joy to handle . . . it behaves beautifully . . . the (Continued on page 79)

FIGHTER GOES ALONG FOR RIDE



CONSOLIDATED-VULTEE B-36
SUPER BOMBER

B-36 "PARASITE" FIGHTER

In a recent flight, the US Army's B-36 Super Bomber flew a record distance of 8000 miles non-stop with a dummy load of five tons. Aloft for a day and a half, the plane could have flown a round trip from Alaska to Moscow. In a straight line, the flight would have taken the plane from Alaska to practically any point on the globe.

DWARFING any other war plane, the Super Bomber is the military version of the XC-99, also built by Consolidated Vultee. The only design difference is that the XC-99's large-diameter fuselage is replaced by a pencil-slim fuselage.

A high-wing monoplane, the B-36 has thick wings placed very well back along the fuselage. The wings show considerable taper in the leading edge.

Now in mass production at the Consolidated-Vultee Aircraft Corporation's plant in Texas, the B-36 carries its own fighter planes and 36 tons of bombs.

The pilot's cockpit is so far from the tail turret that a tiny railway is

installed and a one-man "truck" shuttles through the pressurised tube connecting the two crew stations.

The B-36 carries enough fuel to take a motor car around the world 16 times. The six wing tanks hold over 20,000 gallons of test spirit.

The body of the B-36 has a volume of 17,724 cubic feet, equal to 10 living-rooms. Its bomb-bay alone has the space of four rail freight trucks, and actually carries the jet-propelled pygmy "parasite" fighter sketched below the mighty plane.

The B-36 is powered by six motors, each developing 3000 horse-power, and mounted along the trailing edge of the wing and driving pusher-type propellers. These 19-foot Curtiss

electric-hollow steel propellers are the largest ever installed on an aircraft. They resist ice and can be reversed to act as an air brake, and to assist in taxi-ing manoeuvres on the ground.

The B-36 has lifted 278,000lb—the heaviest load ever lifted by a plane.

Principal dimensions of the plane are: Wingspan, 230ft.; and length 182ft.

At present its average speed is only 222 miles an hour because motors of large horse-power are not yet available.

The "parasite" jet fighter carried by the B-36 is to be released if the bomber is attacked.

The fighter has no landing gear. Its take-offs and landings are made by means of a hooking mechanism. The wings are folded back when it is in the bomb-bay.

The "pygmy" is a low-wing monoplane, with an old tail assembly which is claimed to give the aircraft maximum flight stability.



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**WITH THE...
"ECONOMY 3"**

Yes, the cricket enthusiasts can monopolise the radio —now that the family has its "second set"! Despite the lowest Aegis price ever offered, this "easy to build" A.C. Kit has all the quality features you want, such as:

- A.W.A. Single Gang Condenser ● Rola or Amplion 5in. Permag. Speaker ● Bakelite Cabinet
- Clearly calibrated glass Slide Rule Dial ● Cadmium-plated metal parts including chassis.

Complete Kit (KS3/B) is, as usual, packed in Aegis sealed carton. Price **£7/7/-**

(plus valves and slightly variable interstate)

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John Martin Electrical and Radio Co.

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Lawrence & Hanson Electrical Pty. Ltd.
(Launceston).
Lawrence & Hanson Electrical Pty. Ltd.
(Hobart).

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Newson, McLaren Ltd.
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Australian General Electric Pty. Ltd.
Cook Bros. Pty. Ltd.
BRISBANE:
Chandler Pty. Ltd.
A. E. Harold Pty. Ltd.
B. Martin Pty. Ltd.

PICTURE NEWS OF THE WORLD'S SKYWAYS

Big Range Of B-29

TWO strategic US Air Force B-29's dropped five-ton bomb loads on Muroc Dry Lakes in California recently on a 4600-mile round trip from Tampa, Florida, to offer dramatic rebuttal to US Navy and Congressional critics of the Air Force strategic bombing capabilities.

Although these missions did not employ mid-air refuelling technique, the Air Force also revealed that B-29s can carry out tactical missions with a 6000-mile range by combining new cruise control techniques with aerial refuelling.

With a 6000-mile range it would be possible for the B-29 to attack virtually any hostile target and continue on to a friendly base.

* * *

Canadian Trainer

AT the request of the Royal Canadian Air Force, a Percival Prentice 3-seat basic trainer will undergo a series of service tests in Canada.

It has already received favorable comment as the result of cold-weather tests recently completed by the Winter Experimental Unit at Edmonton and Watson Lake.

This Prentice, now in Canada on loan to the Ministry of Supply from the RAF, is expected to be made available for use by the RCAF in the near future.

It will be handed over to the Directorate of Training for tests at Rockliffe and Trenton.

It is the only machine of its type to be equipped with SBA (Standard

Beam Approach) and amber colored instrument flying screens as well as VHF radio and a full blind flying panel, and is the first trainer to be specially designed for use in the RAF's new all-weather training scheme.

Under this scheme, student pilots are taught from the start of their career to appreciate that with modern instruments and equipment, practicable to fly in all weathers.

An innovation in training aircraft in this class is the third seat behind the instructor and pupil.

In this seat, another pupil is able to see and hear what goes on in the course of flying training, and to get flying experience, so that when his turn comes to receive instruction at the controls, a considerably shorter period will be required for his training.

A 250 hp Gipsy Queen drives a constant speed propeller, giving the Prentice a top speed of 155 mph.

* * *

The Day's Work

LOCKHEED test pilot Stanley Beltz gave some US Air Force and Navy brass-hats the fright of their lives recently when he asked the Anacostia (Washington DC) tower to clear the Navy field for his approach in a Lockheed P2V Neptune.

Beltz flew the big, twin-engine patrol bomber in on one engine, and then, as the brass scuttled for cover, he slow-rolled it at less than 500ft. altitude.

Beltz concluded with some stiff turns into the dead engine.

Big British Transport

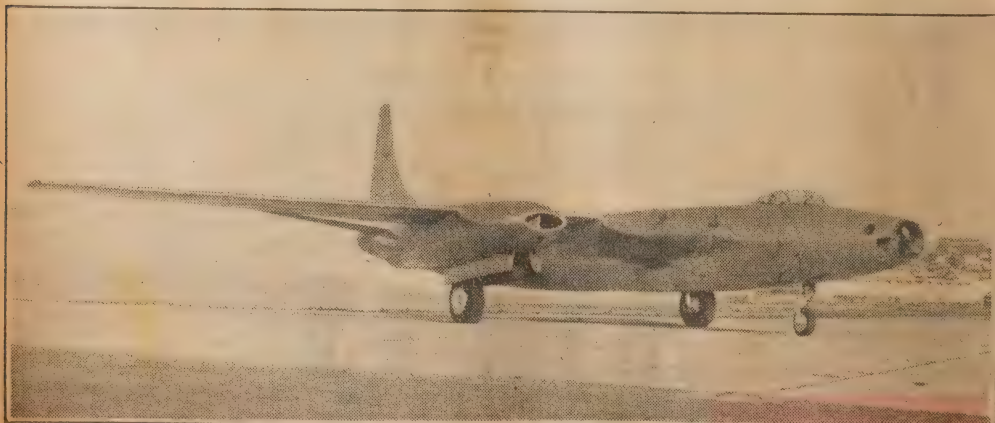
IN less than a year's time, General Aircraft, of Feltham, Middlesex, plan to have their first Universal transport in the air. Two are being built and will be assembled at Southampton airport from parts made at Feltham.

The Universal is one of the larger enterprises upon which the British aircraft industry is now engaged. It has a span of 162 feet, a height of 31 feet, and a length little short of 100 feet. It will have an all-up weight of 95,000 lb. (42.5 tons), will be powered by four Bristol Hercules 261 air-cooled radial engines, giving a total of 7800 hp for take-off, and offer some 5760 cubic feet, of uninterrupted freight space in the main compartment.

If fitted out as an air liner, the Universal will be able to seat 90 passengers. Alternatively, as a freighter-cum-airliner it can seat 30 passengers on an upper deck and still leave space for some 20,280lb. (nine tons) of freight and cargo for a 500-mile stage. Maximum payload is 25,380lb. (11 tons).

This figure is exceptionally high and represents nearly 25 per cent. of the all-up weight. Many airliners now in service cannot carry more than eight to ten per cent. payload. Even for stages of 1000 miles the payload of the Universal is 15,750lb., or, roughly, 16 per cent. of the all-up weight.

Another asset which the Universal will possess is a particularly low direct-operating cost. For a stage of 500 miles this will work out at only 9½ per ton mile.



America's fastest bomber, Consolidated Vultee's jet-propelled XB-46, shown making a high speed taxi run prior to its first test flight. The sleek bomber took off from San Diego's Lindbergh Field, flew over southern California for an hour and a half and landed at Muroc Field, where future flight testing will be conducted. The XB-46, under secret development at Convair's San Diego plant for the past two years, is powered by four J-35 turbojet engines housed in two low-slung nacelles. This two-engine-per-nacelle arrangement, coupled with the extreme aerodynamic smoothness of the plane, makes the four-jet bomber look like a twin-jet fighter. The needle-shaped fuselage of the new Convair bomber is 106 feet long, only seven feet less than the 113 foot wingspan. Height is 28 feet. Gross weight is 91,000lb and useful load 42,982lb.

J.S. Air Plans

THE United States Navy Bureau of Aeronautics has placed procurement contracts with eleven American aircraft manufacturers for production of 1208 aircraft during 1948, and has already announced contracts with eight manufacturers for delivery of 424 aircraft during 1949.

The latter are only initial orders to be augmented later in the year.

Of the 1948 total, 95 per cent. are conventional propeller-driven craft of early wartime design, which were in production during the last two years of the war.

This near total procurement of reciprocating types (only 60 jet aircraft are scheduled for production this year) points up the US Navy's continued reliance on service types already well integrated into the carrier divisions of the fleets as the best combat aircraft for efficiency and economy.

By introducing jet types in the service, the US Navy believes it can maintain training, maintenance and operational expenses for naval aviation at a minimum.

Scheduled for steady production through 1948 are:—

Chance Vought F4U-5-Corsair.—This new model of the wartime Corsair features a top speed increasing towards the 500 mph mark, simplified functional cockpit and improved power plant and cowling.

Grumman F8F-1-Bearcat.—US Navy will buy 300 of the new F8F-1 model, featuring 20 mm. cannon armament and new power plant design, placing the stubby craft in the 500 miles an hour top speed class.

Grumman F9F-2-Panthers.—Features interchangeable Pratt and Whitney made Nene and Allison turbo jet engines.

High top speed near 650 mph and landing speed of only 35 mph are new US Navy jet performance records.

Rolls-Royce News

ROLLS-ROYCE jet and piston aero engines are in the news again. The Argentine Government has concluded an agreement with Rolls-Royce for the manufacture of the Derwent turbo-jet in Argentina, and Merlin engines have completed more than 100 million engine-miles in airline operations over some of the longest and most difficult routes in the world.

Negotiated for the Argentine Government by the Instituto Aerotecnico Secretaria de Aeronautica, Cordoba, the Derwent agreement was ratified by President Peron.

This important trade agreement will benefit Great Britain as well as Argentina. Acquisition of the licence to make the Derwent means that the Argentine Government will be able to start production with a jet engine which has been thoroughly tested and which has proved completely reliable in world-wide service. The Derwent powers the Meteor, fastest fighter in squadron service in any part of the world.



This 2-seater, all-metal Chipmunk, with a 145 hp Gipsy Major engine, has a top speed of 145 mph and at a cruising speed of 124 mph has a range of 485 miles. Ski or float undercarriage may be fitted.

An Argentine jet fighter, the "Pulque" (Arrow), fitted with a single Derwent, has already flown. Engineers from the Argentine are at the Derby works of Rolls-Royce learning the newest technique of jet engine manufacture, while Rolls-Royce engineers are in the Argentine to assist with the equipping and tooling-up of the factories where the Derwent will be made.

The conclusion of the agreement marks another step in the development of the cordial relations already existing between Great Britain and Argentina, where numbers of British aircraft are already in service. It also provides further evidence of the universal acceptance of the supremacy of British jet engines.

Licences to manufacture or import Rolls-Royce aero engines, including the Nene or Derwent, have now been preparing to produce the Nene engine.

Helicopter Crash

FAILURE to flare out at the end of an autorotational approach is blamed for the accident to a Plasecki HRP ten place transport helicopter. The nose of the craft was badly damaged. Leland ("Bud") Felt, test pilot, was killed.

The high rate of descent of a helicopter in autorotation (considerably higher than a conventional airplane) requires the pilot to build up forward speed during his landing approach, and to execute a rapid flare out before touching the ground to slow the landing.

Although the definite cause of the crash has not yet been determined, it appears that the pilot either failed, or was prevented from, increasing the collective pitch at the proper moment.

Detachable Nose Technique

AMERICA'S National Advisory Committee for Aeronautics is experimenting with simulated aircraft nose ejection supersonic speed through the use of rocket-powered research missiles at the NACA installation on Wallops Island, Virginia.

Models of detachable nose compartments, similar to those used on the D-558-2 Skystreak, are fired at supersonic speed, and their free-flight action studied by motion pictures and radar tracking.

Object of the research programme is to develop a detachable nose section as nearly stable in free flight as is practical under considerations of the form required for entire aircraft.

New Tandem Helio

THE Helicopter Engineering and Research Corporation announces first flights, without difficulty in control or vibration from the very first, of a new tandem helicopter, the JOV-3, designed by D. K. Jovanovich, with F. J. Kosloski and George Townson as his principal associates.

Powered by a small engine, the JOV-3 has a gross weight empty of 800 pounds.

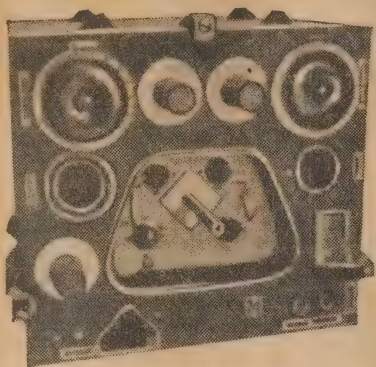
Top speed is estimated at 100 miles per hour and range is to be 138 miles, at the best cruising speed of 73 miles per hour.

Service ceiling has been estimated at 12,000 feet (on an inclined flight path).

The two three-bladed rotors are less than 19 feet in diameter.

The helicopter has as thus flown as a single-seater; a dual set of controls can be installed readily for training or passenger-carrying.

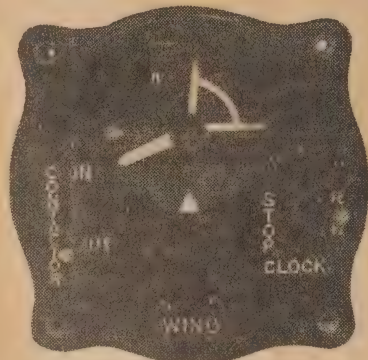
NEW AND USED DISPOSALS EQUIPMENT



AR14 RECEIVERS

LESS VALVES AND COILS
(odd coils suitable for rewinding for
above set available at 10/- per doz.
Post free).

37/6 F.O.R.



NEW PRECISION TIMER

48 hour jewelled movement suitable
for repetition timing over periods of
one minute. Ideal for photographic
work, electric sign switching etc.

18/6 Postage 2/- extra.

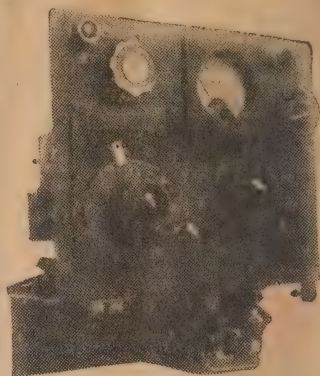


NEW "BIRKO" SOLDERING IRONS

80 watt operates on 12
or 24 volts.

19/6

Postage 2/- extra.



101 TRANSCEIVER UNITS

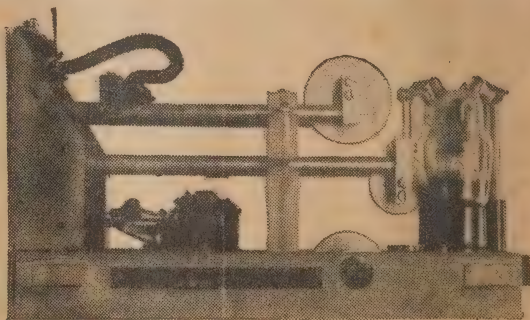
TRANSMITTER Less Valves and Meter.

37/6 F.O.R.

R.F. Meter for above 10/- extra.

RECEIVER LESS VALVES 37/6
F.O.R.

Brass carrying case supplied free if both units are
purchased.



PARALLEL LINE OSCILLATOR

Complete with 2 CV63 valves tunes the 144 mc. Band
and higher. Lecher bars are silver plated.

42/6 Postage 2/6 extra.

All the Above Items Available at:—No. 5 ROYAL ARCADE, SYDNEY.

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TELEPHONE: UA2145

ADDRESS ALL MAIL TO:
BOX 14, PO. HABERFIELD,
N.S.W.

FIELD STRENGTH METER

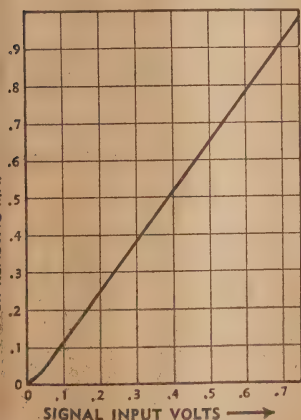
(Continued from Page 39.)

The tuning control is mounted centrally beneath the meter and, as tuning is not particularly sharp, it is quite satisfactory to arrange a direct drive knob for the condenser, with a luloid cursor sweeping a card-ward scale. In an instrument like this, direct calibration is a great asset.

The band switch is in the lower left-hand corner of the panel, and a three position "off-on" switch in the lower left-hand corner. The exact position of all these controls can be seen from the panel and rear photographs, the latter being taken before the coils were actually soldered in place.

TERIALS

In practice, the instrument may be used with a number of alternative terminal arrangements, notably a vertical or horizontal rod or coaxial input from a resonant antenna. To provide for this, the instrument panel accommodates a coaxial socket and a group of three terminals in the upper



This curve of R.F. input volts against meter reading is linear except for very low input values. The exact slope will vary slightly with individual valves and with battery voltage.

right-hand corner. A length of stiff wire, such as a light rod antenna can be clipped into these terminals in either a vertical or a horizontal plane. Electrically only the common terminal need be connected to the tuned circuit, the other two simply being insulated from the panel.

Polarisation of the antenna will be most important at 50 megacycles, becoming progressively less so at the lower frequencies. The sensitivity of the meter can be varied over a fairly wide range by using different lengths of antenna rod and its proximity to the transmitting antenna. Field strength measurements are best made at several wave-lengths distant from the antenna, and in a loca-

TRAINER USES MAMBA JET POWER

(Continued from Page 73)

engine is very pleasant.

The Balliol is an all-purpose advanced Service Trainer and is designed to meet the requirements of modern advanced training by day or night in flying, gunnery, navigation, bombing, photography and glider towing. It can also be readily adapted for deck-landing. Throughout the design, ease of maintenance has been a primary consideration and no effort has been spared to provide light but effective controls, in every way characteristic of the modern fighter.

ROOMY CABIN

Instructor and pupil sit side by side in a roomy cabin with a fine all-round view. In line with RAF requirements for night flying training, the forward part of the cabin is fitted with tinted panels, which, when raised pneumatically by the touch of a button, reproduce night-flying conditions in daylight, as seen by the pupil through special tinted goggles. The instructor, who does not wear these goggles, is flying in daytime conditions.

The Mamba engine permits a slim, neat cowl, contributing to the Balliol's compact appearance. On the starboard side of the body, just behind the wing, the jet pipe emerges and the thrust from this—about one-fifth of that delivered by the propeller—assists in giving the airplane a top speed approaching 300 miles per hour.

BRITAIN'S LEAD

The mounting achievements of Great Britain's turbo-prop engines provide evidence of their established lead in this field, matching her superiority over other countries in turbo-jet development.

In the three years since the Trent-

engine Meteor—the world's first turbo-prop powered airplane—took the air, the carefully-planned programme of turbo-prop development has gone steadily on.

Three engines have passed the arduous 150-hour Type Test—the Bristol Theseus, the Rolls-Royce Clyde and the Mamba.

The Bristol company also has under development their powerful Proteus, the 2540 hp Phoebus, and the Janus, originally designed as a helicopter power unit and developing about 500 hp.

At Derby, Rolls-Royce are working on the Tweed, the Avon and the Dart, the last-named being well advanced, with substantial flight-testing behind it.

Armstrong Siddeley, whose Mamba I has been specified for several new aircraft, are developing the 4000 hp Python and the Cobra, as well as a more powerful version of the Mamba, the Mark II.

TWO MORE TURBO-JETS

Two more turbo-prop engines, the 1500 hp Naiad and the 500 hp Nymph, are in hand at the Napier company's factory, and Major Frank Halford has his development team working on the De Havilland H.3, of about 450 hp.

Here, in numbers alone, can be seen the scale of the British effort in the new field of aeronautical engineering. In all, five different companies have fifteen gas-turbine-propeller engines in varying stages of development. Several years of intensive work are now producing results. Some of the forging types may not reach the production stage, but there is no doubt that the effort now being expended will see handsome returns in the future.

tion free from obstructions and reflecting surfaces.

The scale law can be determined by direct calibration from a good signal generator or, if that is not available, from an audio frequency source. For this latter purpose the grid should be disconnected from the tuned circuit, and the signal fed to it through a .01 mfd condenser temporarily wired in place of the .0001 grid condenser. Vary the audio input voltage, which can, of course, be read on an ordinary multimeter, and note the reading of the plate milliammeter.

You will find that the scale law of this instrument is practically linear, showing slight curvature at the extremes of the scale. In the original instrument and R.F. input voltage of from 0-1.4 was sufficient to swing the pointer almost linearly over the range 0-1 milliamp. The sensitivity will vary somewhat as the high tension battery ages, but it should be sufficiently constant to give a good relative indication of change in field strength, measured either in volts or decibels.

Another possible application which

suggests itself is that of wiring a 455 I.F. amplifier coil to the switch and so arranging matters that the meter can be used to measure directly the volts input to a receiver detector. By shorting the A.V.C. the meter can then be used for comparative readings from a distant station.

The World's Fastest Trainer

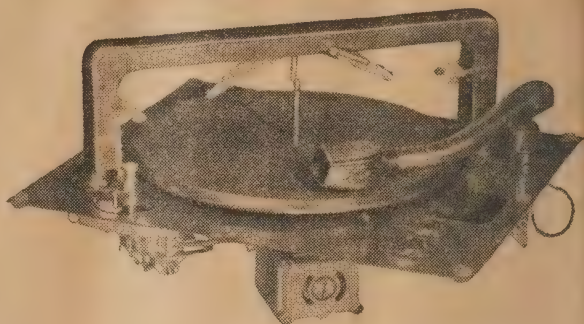
THE world's fastest trainer plane has just made its first flight. Known as the Meteor VII Trainer, it is a two-seat dual-control version of the famous Gloster Meteor fighter, and is designed to bridge the gap between the piston-engined advanced trainer and the operational jet-propelled fighter.

Squadron-Leader Bill Waterton, chief test pilot for Gloster's, flew the bright red aeroplane for 26 minutes on its first flight, testing it for general handling and trimming. He reported its flying characteristics to be almost the same as those of the standard Meteor IV fighter of the RAF.

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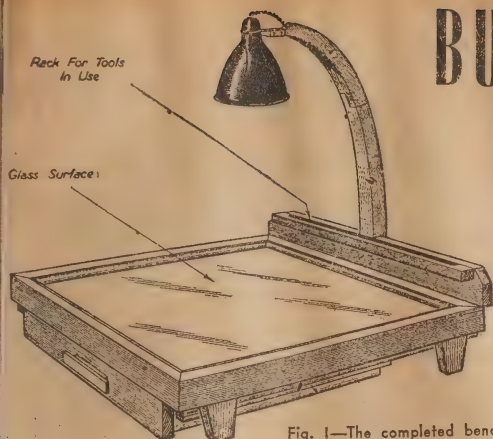


Fig. 1—The completed bench showing lampshade and supporting column.

THE advantages of a portable bench for model engineering work are numerous. Particularly so during the winter months when such a bench may be safely used on a polished table—hence increased comfort from which better work is likely to result.

The bench to be described is made entirely from wood, with the exception of five metal clips, and is easy to construct, involving only one half-lapped joint. The cost to make is only a few shillings, for it will, in many cases, only mean purchasing a square of glass, lamp-holder and flex, &c.

Fig. 1 shows the bench in its basic form, on to which other attachments, such as a part cover for the glass to which a small vice or bench drill may be fitted; or

Where space is restricted, a small bench for model making is a great help. The glass top is optional, but has a number of valuable applications in certain cases where assembly of fine parts is required.

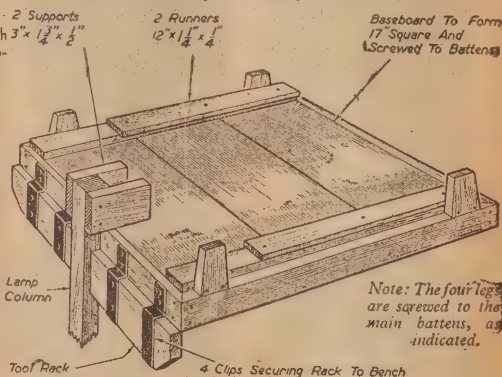


Fig. 4—General assembly of underside of bench.

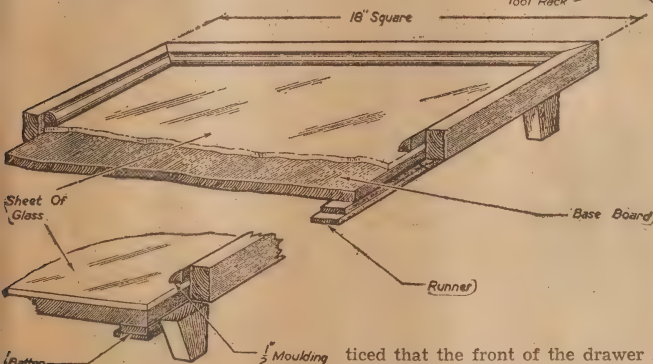


Fig. 3—Assembly of top side of bench and detail of moulding and under-batten.

perhaps a flap cover fixed to the top surface of the drawer to provide an auxiliary bench top when assembling a complicated mechanism can be incorporated as need arises.

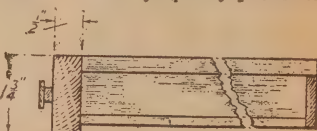
THE DRAWER

Fig. 2 shows the details of the drawer, the width of which is 14 1/2 in. to the insides of the runners. There is no real need for any other than butt joints, glued and screwed, or even panel pins in the place of screws. The handle of the drawer can be made in two pieces as depicted, finally glued and screwed, as are the rest of the pieces which go to make the finished job. It will be no-

ticed that the front of the drawer is 1 1/2 in. deep, the drawer proper being 1 5/8 in. deep. This is to ensure its sliding easily in use. Suitable divisions for such a drawer are a matter of individual taste, but those shown have proved satisfactory in

GENERAL ASSEMBLY OF THE TOP

The actual bench is seen to comprise a base (Fig. 3) around which there are four side pieces, each of which is 18 in. by 1 1/2 in. by 1/2 in. These



Side View

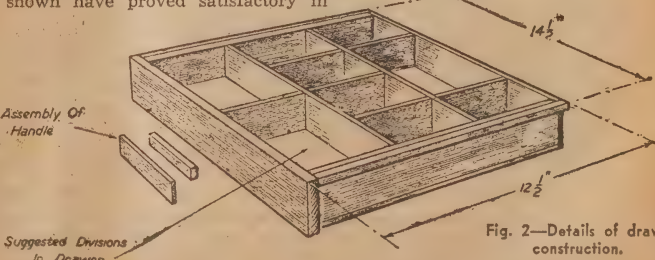


Fig. 2—Details of drawn construction.

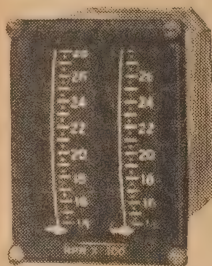
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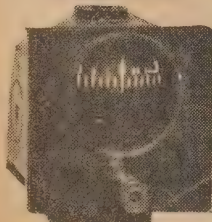
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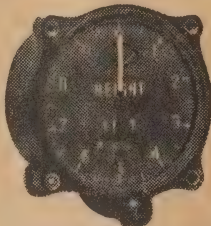
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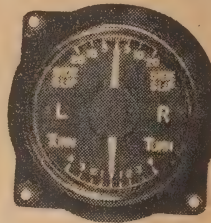
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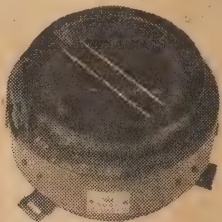
ENGINE REV.
COUNTER, £2.



ALTIMETERS, £3/10/-.



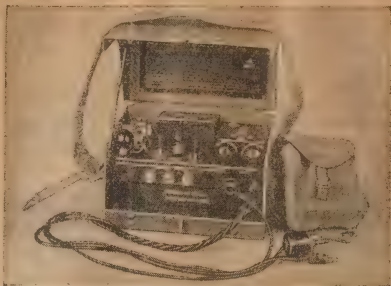
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SECOND HAND. Slightly damaged aircraft
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MAIL ORDERS CAREFULLY AND PROMPTLY CARRIED OUT

de members form a frame for reining the glass, which is prevented on falling out by four lengths of n. corner moulding. The moulding is fastened to the framework by panel pins. The drawer slides in the slots formed by the baseboard, battens, and runners. A square of glass is required, and should be tightly under 17in. square.

UNDERSIDE OF BENCH

The baseboard can be made from number of pieces of wood 5-8in. thick held together by two battens 1in. x 1in. x 3-8in. As the drawer is only 12in. long, the runners need only extend for the 12in., these being used and screwed to the battens.

Four legs, which are 1½in. long, 1in. wide at the top, and 1in. wide at their base by ½in. thick, can now be fixed to the battens and the under edge of the frame, one inch on the corners (Fig. 4).

The lamp column is held securely by two support blocks as shown, and further steadied by the two pieces constituting the tool rack body.

LAMP COLUMN AND BRACKET

The illustration, Fig. 5, shows the profile of the lamp column laid out in inch squares. To prevent a large section of the column having short

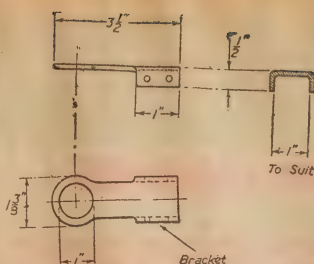


Fig. 5—Details of lamp supporting column and bracket for lamp holder.

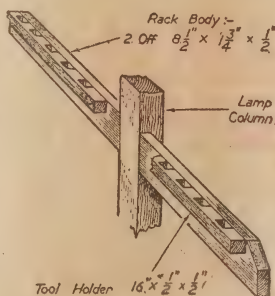
grain owing to the curve, it is necessary to half lap two pieces of wood each 1in. sq. at approximately the position shown, taking care that the grain in the wood is near enough as indicated in the diagram. The lamp bracket fits the ½in. part of the column, and is held in position by four small screws. The 1in. diameter hole is to suit an ordinary bayonet fitting lampholder. Any piece of steel or brass about 1-16in. thick is quite suitable for this bracket.

The rack body illustrated in Fig.

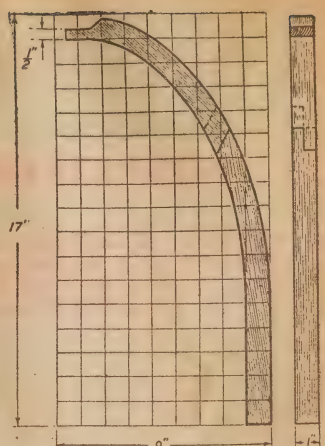
THE TOOL RACK



Fig. 6—The tool rack and fixing clips.



6 is made in two sections and secured to the framework of the bench by the four clips, which for preference should be 1/16in. thick. The actual tool holder is in one piece and has a number of slots in it to receive the various tools



in use. The holder, being in one piece, stiffens the body and results in a rigid fitment.

PAINTING THE BENCH

To put the finishing touches to the bench, a coat of paint is a necessity. In order to finish this well, all screws and nail holes, &c., must be filled up. A good stopping mixture can be made by mixing powdered chalk (french chalk is excellent) and some of the paint to be used on the bench. Mix these two until a stiff smooth paste is obtained and smear over the parts requiring the treatment, leaving a slight surplus as when applying plastic wood. After this paste has hardened, smooth with glass-paper, and apply a flat or glossy coat of paint. Rub this down smooth after it is thoroughly dry and apply the top coat.

Fix an opaque lamphshade after wiring the lampholder, neatly fastening the flex to the side or back of the column. The bench is then ready for use.

FROM THE SERVICEMAN WHO TELLS

(Continued From Page 43)

ature of holding the soldering iron barrel down the centre of the coil corner. I left it there until the wax on the coil was bubbling quite errily, after which the coil was allowed to cool and the can temporarily restored to its place. Still results—what the Hee...?

At this stage "The Serviceman Who Tells" very nearly had a convulsion to make. But out came the meter for a final check over the circuit and components. Wait a minute... the oscillator coil may have missed H.T. to the plate, but the distance was 2000 ohms. The connections had already been resoldered so that the trouble must be in the ending.

There was nothing for it but to remove the coil for inspection and it was fortunately not a very difficult job. It was an old type solenoid with one winding on top of the other,

separated by a layer of waxed paper. At three spots on the coil, just visible through the paper, was a slight greenish discoloration. Scratching through the paper revealed the cause of the trouble, a spot of verdigris and the wires eaten away. Here was the 2000 ohms of resistance—not enough to prevent the autodyne from receiving its (almost) nominal plate voltage, but sufficient to prevent oscillation.

Since it was a very simple matter to do so, I rewound the coil with the same number of turns and the same gauge wire, and that was that.

It sounds so simple to say... "just a faulty oscillator coil," but the time one spends tracking down and rectifying an obscure trouble like this can cut deeply into one's time and profits. It raises the very contentious matter of how best to charge for such a job. But I can't go into that now. Perhaps next month.

11- Valve Short Waver

(Continued from page 65)

are controlled by a four - position switch, and in the fourth position, the crystal oscillator is turned on, its tiny output being coupled into the aerial circuit. This has the effect of creating a strong carrier which is fed through the set. By noting the deflection of the S meter, you can quickly find the band-edge, and line up the set in a matter of seconds. Actually, any crystal which falls in all the bands with its harmonics will do, as long as you know its exact frequency, and mark the appropriate reference points on the dial. If you arrange for the BFO to be "on" at the same time as the crystal, you will get a beat note, but with this method of bandsetting, you must be sure each time that your BFO is tuned exactly to zero beat, or your readings may be several kc. out. We have found this little device worth its weight in gold, and the value of having a quick frequency and calibration check at a flick of a switch is enormous.

NEW STATION LOGGINGS

NORWAY

Most listeners will now be quite used to hearing the Norwegian station LLG on 9.61mc. in the early mornings before VLW5 comes on the air but may not be aware that there is now a new one audible in the afternoon on 15.175mc. using the call letters LLM.

Listen for this one in the afternoon when it opens at 4.30 pm with a choir singing followed by musical numbers, and at 5 pm they give a time signal. There is slight interference from London on 15.18mc. but if in doubt about LLM a good idea is to compare the programme with LKQ on 11.735mc. which carries the same programme and comes in at better strength.

TANGIERS.—Although this is strictly not a new station it has now been heard on a new frequency for some considerable time. We refer to Radio International in Tangiers which used to be on 6.2mc., but which we have been hearing on 6.265 mc. and at 7 am the broadcast is clock striking 10. At 5.15 am they have a session in English, but it's very weak and can only just be followed. Just as we go to press, Radio International has moved back to its former frequency of 6.2 mc. but we give the above information in case they move back to 6.265mc. This station verifies all correct reports.

DALAT FIC.—Radio Dalat has been heard for quite some time now, but we do not appear to have listed it among our new stations. In our latest report from Miss Sanderson we notice that she has been hearing Dalat on a frequency of 7.145mc. but at our location we have measured their frequency as 7.2mc. so it is possible they have changed since Miss Sanderson compiled her report. Their programme consists of recordings of Western type music and they close down at 10 pm with the well known tune "Rum and Coca Cola." We have not heard of anyone in Australia receiving a verification from this station.

CZECHOSLOVAKIA.—A few weeks ago we heard a Czechoslovakian station on a frequency of 11.76mc. around 2 am. According to our lists this would be OLR4B and we now find in the latest issue of the Swedish DX Bulletin a reference to a station in Czechoslovakia being heard about 11.75mc. so evidently this was the same one being heard on about 11.75mc. so evidently this was the same one that we heard. Reception reports were asked for so it would appear to be test transmission. While speaking of this country we note that their morning transmission in the 31 metre band is still being heard at excellent strength and more readily understood than when they were on 6.01mc. in the 49 metre band.

USA.—There is hardly a month goes past without noticing some of the American stations on new frequencies or with changed calls. This last month we have noticed WLWR operating on both 11.71 mc. and 15.33mc., KCEI on 15.21mc., WLWL on 21.69mc., WNCX on 21.73mc., and possibly there are a few others. While tuning in between bands one night recently we came across WQB2 with a terrific signal on 18.92mc., when they

were relaying the domestic CBS programme to Berlin. This of course was not a regular broadcast and came within the point to point services which cause so much disappointment to new listeners who do not appreciate that these stations will not as a rule verify listeners' reports.

AUSTRALIA.—News of new outlets for Radio Australia is always of interest to some of our readers as these stations provide a very good opportunity to obtain quite a number of verifications before going after some of the harder-to-log overseas transmitters. A new one this month is VLG11 on a changed frequency of 15.2mc. instead of their old one of 15.21mc. This outlet is used in the North American service which comes on the air at 2.30 pm and continues until closing at 3.45 pm. A good time to listen to this one would be on a Sunday afternoon at 3.25 pm when Graham Hutchins' DX session is on the air.

SHORT WAVE NOTES for the August issue are due on July 12. For the September issue they are due on August 7. Please send them direct to Mr. Ray Simpson, 80 Wilga-street, Concord West, NSW.

NICARAGUA.—In last month's issue we published a paragraph on a new station in the above country which we had been hearing for many weeks on a frequency of 6.33mc., and which we thought was located in the capital, Managua. After we went to press we received a copy of the Universaliste and sure enough this station was listed as being in Managua, but the call letters were not given.

The interesting point now is that the station has now changed its frequency to 6.3mc., possibly to escape the severe Morse interference on 6.38. The new channel is no better, however, as far as identification is concerned, as we are still unable to give any further information about it.

PALESTINE.—According to overseas publications quite a number of new transmitters have been heard from this troubled land during the past few months. Most of them have been what one might call under-cover stations such as "Koloha-Haganah," which has been using a frequency of 6.96mc. until closing at 6.45 am, when they announce that they will resume broadcasts later intended for the Hebrew Forces. Two other Palestine stations heard overseas are ZNT18 on 19.205 mc. and ZNT19 on 19.14mc.

FLASHES FROM EVERYWHERE

CHILE.—The well-known Chilean station CE622 now has a new welcome innovation, they give identification in English shortly after the station comes on the air at 9.30 pm. It is given by Scotsman and is as follows: "Good morning, everybody you are tuned to station CE622 transmitting on a frequency of 6.220kc. in the 49 metres band. Station CE622 transmits daily from 7.30 am to 12 midnight. The station is owned and operated by the National Mining Society, Santiago, Chile, South America. We sincerely hope you have enjoyed our programmes and would appreciate reports or reception in your locality. Please address your reports to PO Box 2626, Santiago, Chile, South America."

SWEDEN.—Direct from the Swedish Broadcasting Service we have received the following information regarding the DX programme schedule. Sessions in English are given on Saturdays at 5.45 pm to 6 pm over SBT on 15.155mc. and SBE on 11.705mc. A recorded version of the programme is then given on Sunday mornings from 1 am to 1.15 am over SBT on 15.155mc. and SDB2 on 10.78mc. and again at 11 am to 11.15 am on the same stations. The DX editor at the station would like to hear from listeners to the session and asks that reports be addressed to him c/o The Swedish Broadcasting Service, Stockholm 7, Sweden. This DX programme is not heard at very good strength, but on some days can be followed fairly well.

CAPE VERDE ISLANDS.—These islands are very elusive as far as reception of short wave radio stations is concerned and we have never had any reports from listeners claiming reception of any of them. The following extract from a Swedish DX bulletin may therefore be of interest as it will be a guide for anyone wishing to try their luck in logging a new country. "CR4AA located in Praia in the Cape Verde Islands has been heard on a frequency of 5.89mc. from 6 am to 11 am. In Sweden the signal was quite strong, but interference from Morse signals was very bad. This station plays the Portuguese National Anthem on leaving the air. Who will be the first to hear CR4AA?"

Ceylon.—Radio SEAC has been carrying out experimental broadcasts beamed to Australia, using a frequency of 15.2 mc. This frequency will be used by Radio SEAC to relay Test matches as they are played. We are indebted to Radio Australia's DX session for details of these frequencies being used by this popular station. In an announcement from the station they quoted them to be 17.73mc, 15.12mc., 9.52mc., 6.075mc. and 3.393mc. All of these channels can be logged in the Eastern Australia with the exception of the 9.52mc. outlet which is somewhat swamped by noise and nearby stations. Although we have not heard it at our location, Radio SEAC is reported to be using 9.82mc. for their special transmission to the British Isles, closing at 5.30 am on Mondays.

MONACO.—Quoting again from the DX session from Radio Australia, we learn that Radio Monte Carlo have been operating their new 25 kilowatt transmitter on a frequency of 6.035mc. since March 8 and their current schedule is from 4 pm to 6 pm, 9 pm to 11 pm and 4 am to 8.15 am. Readers will remember we reported hearing this station on 6.038mc. which according to our measurement, still seems to be more correct than 6.035mc. A second 25kw shortwave station will be put into service in June or July and will operate in the 25 or 31 metre band. Listeners should watch out for this station, as quite possibly it may be on the air by the time these notes are in print.

NEW STATION LOGGINGS

| Call | Kc. | Metres | Location | Time Heard |
|----------|-------|--------|--------------------------|------------|
| Tangier | 6265 | 47.89 | Tangier, Morocco | 6.00 am |
| Dalat | 7200 | 41.67 | Dalat, French Indo China | 9.00 pm |
| OLR4B | 11760 | 25.51 | Prague, Czechoslovakia | 2.30 am |
| Italiana | 15120 | 19.84 | Rome Italy | 9.30 am |
| LLM | 15175 | 19.77 | Freidrikstad, Norway | 4.30 pm |
| VLG11 | 15200 | 19.74 | Lyndhurst, Vic. | 2.30 pm |
| Athens | 15345 | 19.55 | Athens, Greece | 6.30 am |

HOME AFRICAN STATIONS

THE many stations in Africa are always much sought after by Australian listeners, especially those living in the Eastern States, as there is always a certain amount of uncertainty in their reception which makes them all the more interesting. The following brief notes mention those which have been heard during the past few weeks.

NORTHERN RHODESIA.—Station ZQP located in Lusaka, which operates on 71mc, comes on the air at 1 am when they give an announcement in English and state that they will commence with the usual half hour of dance music. The strength of this station is now quite good and no difficulty should be experienced logging it on a good morning.

MOZAMBIQUE.—Stations in this Portuguese colony are among the best heard from Africa and on recent Saturday afternoons we have noticed CR7BJ on 9.65mc, coming in very nicely until closing at 4 am. Possibly the best of all transmitters from Lourenço Marques is CR7BV on 9.25mc, in the early morning when they have a session calling listeners in South Africa. Another station in Mozambique, but located in Beira is CR7BJ on 7.55 mc, which is sometimes audible around 1 am, but not at the same strength as Lourenço Marques.

BRITISH SOMALILAND.—Some overseas reports gives the Hargeisha station (Q6MI) as being on 7.35mc, around 1 am, but we have found no trace of it at our location or on its old channel of 7.12 mc.

SOUTH AFRICA.—Reception from the Union seems to vary from week to week and about the only station which is consistent is Capetown on 5.883mc, which can always be heard till closing at 7.5 am. Pietermaritzburg can usually be heard around 6 am on 4.878mc, but Rex Gillett noted it one morning on 4.855mc, which is its old channel. Johannesburg on 9.523 mc, is erratic, but is sometimes audible at 2 am. ZRB in Waterkloof, the Air Force station on 9.11mc, was quite good just after midnight one Saturday when they gave a relay of the Epsom from the BBC and then after a weather report gave a broadcast of a Rugby match between Natal and Pietermaritzburg. This frequency seems to be nearer 9.1mc than 9.11mc.

THIS MONTH'S VERIFICATIONS

YSWA SALVADOR

One of the best verifications we have heard of for some time now is one recently received by Art Cushen for YSWA which is located in Santa Ana in El Salvador. This station is known as "La Radio del Pueblo" which in English means "The Peoples Radio."

THIS Central American station which operates on 6mc, was very pleased to receive a report from New Zealand and in their offer he has asked them to programme at a time suitable for reception in NZ which generally speaking would also suit listeners in Australia.

Art Cushen has advised us that following their offer he has asked them to transmit this special programme on Sunday, June 13 from 3.30 pm to 5 pm Eastern Australian Time.

The programme will be of Spanish type music and possibly there will be announcements in English each quarter hour. Unfortunately we did not receive this information in time to advise readers in last month's issue but these details may be of use to you in event of your hearing the station and not being able to identify it. The only station in this country we have ever heard is YSD which was logged and verified over 10 years ago when they were operating on 7.894mc. We will look on this as one of our best verifications and on a par with HRN in Tegucigalpa, Honduras.

ZRB, SOUTH AFRICA.—Readers will remember in a recent issue we reported hearing ZRB on its new frequency of

New Schedule for Radio Australia

AS from June 10th Radio Australia has made alterations to their various transmissions both for the Forces Broadcasts and also those directed to overseas countries. As these transmissions are of interest to many listeners in this country we show below brief details of the new frequencies and timings.

WEST COAST OF NORTH AMERICA & AFRICA

12.30 pm to 1.45 pm.—VLA5 15.32mc; VLC9 17.84mc; VLB5 21.54mc; VLG11 15.20mc.

EUROPE & TAHITI

4.0 pm to 4.45 pm.—VLA8 11.76mc; VLG6 15.24mc; VLA6 15.20mc.

SIAM (Wed. only)

4.30 pm to 4.50 pm.—VLC 15.20mc.

BRITISH ISLES & EUROPE

5.0 pm to 6.15 pm.—VLA6 15.20mc; VLB3 11.76mc; VLC10 21.68mc.

NEW CALEDONIA

5.45 pm to 6.45 pm.—VLG3 11.71mc; VLC4 15.32mc.

FORCES & ASIA

6.30 pm to 9.45 pm.—VLB3 11.76mc.

6.55 pm to 9.45 pm.—VLC4 15.32mc.

6.30 pm to 2.15 am.—VLA6 15.20mc.

6.55 pm to 1.0 am.—VLG3 11.71mc.

EAST COAST OF NORTH AMERICA

10.0 pm to 11.45 pm.—VLB 9.54mc; VLC7 11.81mc; VLB3 11.76mc; VLG6 9.615mc.

WEST COAST OF NORTH AMERICA

1.0 am to 2.15 am.—VLC3 11.76mc; VLB9 9.615mc; VLG 9.58mc.

BRITISH ISLES

6.0 am to 7.55 am.—VLC 15.2mc; VLA8 11.76mc; VLB 9.54mc.

FORCES & NORTH AMERICA

7.43 am to 9.15 am.—VLB11 15.16mc; VLA8 11.76mc.

8.10 am to 9.15 am.—VLC 15.20mc.

BRITISH ISLES & EUROPE

7.43 am to 9.15 am.—VLG6 15.23mc.

SMALL SHIPS

Quite an interesting change from the usual broadcast short wave stations and the amateurs are the broadcasts from many small ships around our shores. The best time to listen for them is around 5.0 pm and in the mornings around 8.0 am. On 6.4mc. VIS Sydney, VIM Melbourne, and VIP Perth can often be heard calling these small vessels and they can usually be tuned in with their reply on 6.28mc. An unusual one was heard recently when we heard VII on Thursday Island calling a ship which was on its way to Rabaul, while on other occasions we have heard VIP contacting the RMS Orion the day before it arrives at Fremantle. Listen for these and we know you will not be disappointed.

and also the Merchant Navy around the South African coast. Keep a lookout for ZRB on 6.21mc and if you hear them send a report to Miss Petherbridge.

TABRIZ, IRAN.—Art Cushen reports having received a verification by registered mail from Radio Tabriz, confirming his reception of their station on 11.96 mc. In their letter they give their schedule as 8 pm to 9.30 pm on 11.96mc, and midnight to 4 am on 6.09mc. News in English is given during the latter transmission from 3.20 am to 3.30 am. There is also a special transmission on Fridays from 4.40 pm to 9 pm on their 11.96 mc, channel. The address of this station is The Director, The Azerbaijan Dept. of Publications and Propaganda, Tabriz, Iran. Most of their programmes are in Near East type languages, but the short session in English at 3.20 am should be useful to compile a report.

BAGDAD S.W. STATION

IRAQ.—Some interesting details concerning the Bagdad shortwave station is given in the Swedish DX bulletin in which they state that according to a recent verification received from that station they advise that they are transmitting on 767 kc, from 2 pm to 3.30 pm and on 767kc, and 7.092mc, from 11 pm to 5 am with a programme exclusively in Arabic. There is another programme in Kurdish from 1 am to 4 am and in English from 4 am to 5 am on 7.062mc. We have had no reports of Bagdad being heard on this latter frequency, but we recollect that Rex Gillett has been hearing a station which was probably Bagdad around 7.09 mc. Perhaps by next month someone will have heard the 7.062mc. outlet.

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KIT SET

"The York" features:

Attractive Bakelite Cabinet (as illustrated); size 10 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ ". Also available in cream.

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BUILDING THE MULTI-TALKIE SET

(Continued from Page 68)

door hinge. In other words, the appropriate lead from the loop was connected to a bolt making contact with one half of the particular hinge. The other side of the hinge connects by a solder lug to a small bolt on the side of the cabinet which passes right through the side of the chassis and locks it in place with a nut on the inside. This bolt, therefore, serves the double purpose of locking the chassis into the cabinet and providing an earth connection for the loop via the lower hinge.

The grid side of the loop connects across to the top hinge and thence to a solder lug protruding inside the main cabinet. A lead is run from the solder lug across to the rear section of the tuning gang. This lead should be no longer than necessary, and should be pushed close to the front of the cabinet after the chassis has been installed. Connection for an external aerial and earth can be provided by a couple of pin jacks mounted in the lid.

The method of connection to the A battery has already been outlined, while connections to the B battery are best effected by a couple of glove-type fasteners mounted on bakelite strip and suitably protected to guard against accidental short circuit.

DOUBLE CHECK

When you come to put the receiver into operation it is important to double-check all wiring, particularly the filament circuit, with the batteries connected, the dummy plug in place, and the operating switch in the "on position."

Then proceed to plug the valves in and check the receiver for performance. Alignment will be necessary, of course, but the procedure is quite standard.

The padding condenser, by the way, mounts against the inside front of the chassis, just below the volume control spindle. One of the mounting lugs is trimmed off to save space. You may or may not require a small parallel capacitance to achieve a definite response peak.

Space does not permit more lengthy discussion of the receiver proper except to stress this one point. The signal pickup on a loop aerial is comparatively small and a personal portable of this type cannot be expected to operate at full strength on all stations when taken outside the strong service area. Once put into the countryside you will begin to be aware of the lower field strength of some B class stations and any discrepancy in the tracking of the loop aerial.

Under these conditions, it is most helpful to carry a length of wire which can be coupled in appropriate fashion to the loop and thrown up over the branch of a tree. A temporary earth is also most helpful. Reception conditions vary, too, in accordance with the terrain and the time of day or night.

A-C POWER SUPPLY

The remaining space we will have to devote to the power supply.

This is built up on a small chassis, measuring 2 5/8-in. x 1 3/8-in. x 6 1/8-in., which is just large enough to accommodate a 30-milliamp transformer of the "Minivox" variety, a 6X5-GT rectifier, 60mA midge choke and a couple of resistors and condensers.

At first glance it may seem strange that we are specifying a 30 mA transformer to carry a load which we have already set at 60 mA. The vital difference is that, in this case, the transformer and rectifier operate into a choke input filter, so that, although current drain is exceeded, the d-c output voltage is very much lower than would be the case with condenser input. In terms of d-c output watts there is not a great deal of difference between the two conditions.

RECTIFIER OUTPUT

The output from the rectifier, therefore, goes straight into the filter choke and is bypassed on the remote side with an 8 mfd condenser. A 1000 ohm 1 watt resistor provides a further high tension filter section in association with the 8 mfd condenser already included in the main receiver.

The filament circuit involves a resistor of 1650 ohms, and a 500 mfd. filter condenser at the low potential end. The filament resistor should preferably be rated at 10 watts for safety, although you can follow our example in making it up with two series-connected 5-watt resistors.

A value of 1650 ohms was correct for the particular transformer and rectifier used in the original supply, but it is conceivable that the high tension would vary by a few volts with differences in transformer design, and in the impedance of the rectifier and choke. For absolute safety it would be wise to check the filament voltage with a substantially higher value of series resistor, reducing it to a point where the voltage

across the whole filament network, measured with a high resistance meter, was exactly equal to 7. You will probably find that our experimental value of 1650 ohms is very close to the mark, but a check on the point would be well worth while.

The complete circuit of the power supply, together with the connections to the plug, are shown herewith.

The power supply can be fitted into a cabinet having exactly the same height and width as the receiver cabinet and just deep enough to accommodate the 2 5/8-in. dimension of the chassis. It is best covered in leatherette to match the cabinet proper.

In the original set the rear cover was made easily removable from the receiver cabinet by leaving two mirror clips on the bottom turning upwards. Slots were cut in the bottom of the power supply cabinet in a position such that they engage the up-turned clips, the cabinets being locked at the top by a simple fastener.

CORRECTION

Electrical connection between the two units is provided by a cord and plug from the power supply which passes through a cut-out in the front face, corresponding with the cut-out in the rear of the receiver cabinet. Simply insert the plug into the socket, tuck the excess wire into the power supply cabinet, and put the two together, as already outlined. This simple method of attachment has obvious mechanical limitations, but it is not anticipated that the composite cabinet will be subjected to violent treatment. The clips do serve, however, to hold the sections together when placed on a bedside table.

After that, it is merely a matter of plugging the unit into the power mains and enjoying the programme which most appeals to you. One final point. Do not switch on the power supply unless it is connected to the receiver, since an excessive voltage would be applied under these conditions to the 500 mfd. filter condenser.

We know it's been a lengthy story but—we hope—an interesting one. It certainly centres around one of the most intriguing sets we have ever had occasion to describe.

ABOUT COMPONENTS—TUNING COILS

(Continued from Page 47)

An iron dust core allows the same inductance to be obtained with fewer turns of wire, which means lower radio frequency loss. Litz-wound iron cored coils are therefore efficient and compact.

In some cases, the iron dust technique is carried to the point where the tuned winding is almost entirely enclosed by a tiny container of iron dust, or it may be wound on a "yoke" which takes the place of the cardboard former. Still higher efficiency is often realised in this way.

One final point, in this connection. By making the iron core adjustable

in relation to the coil, it is possible to vary the inductance over quite a wide range, which is equivalent in effect to removing or adding turns. You will appreciate the value of this feature as you become more familiar with modern receiver design.

It seems that many paragraphs have proceeded from the type of and we have only mentioned out the the more important point of tuning design and development has been said coils. Hardly anything has been said about winding for yourself but perhaps we can save that till next month.

THE HAM BANDS WITH BILL MOORE

Most amateurs have seen the sketch on the latest QST cover displaying K2UN, the United Nations amateur radio station. K2UN has been heard on many occasions on the 20 metre American telephony band. Running 1Kw to a rotary beam signal strengths reach very high levels.

The station, according to the operators Sandy and Andy, is an amateur operator's dream.

Two 1KW Temco transmitters are used, one covering 10 and 20 and the other 40 and 80. The station is generally heard on 14175 kc/s, and you won't miss K2UN when tuning through the band.

The station is located under ideal conditions in the headquarters of UNO at Lake Success, and opened up on 20 on May 20. Attractive QSL's are being prepared, and will be forwarded to all concerned. Wide-spaced beams are used on 10 and 20 metres, four elements on 10, three on 20. The station has been testing to eliminate interference with UN shortwave broadcasts.

An extended operating programme will be arranged shortly, with plenty of early morning work, allowing plenty of Australian contacts. The station will publicise UN work, a new method of putting UN ideals before the citizens of the world.

* * *

NEW BANDS RELEASE

THE Department announced the release of new frequency bands for amateur stations from June 1. News of the release was broadcast over official WIA stations.

The first band is from 26960 to 27230 kc/s, and is available for A, A2 and FM transmissions. This band is in line with amateur allocations as arranged at Atlantic City. It will eventually be available according to the agreement, in Zone 2, the Americas and in Zone 3 in Australia and New Zealand, and by special arrangement in South Africa. It is a band shared with industrial equipment. This band takes the place of 27185 to 27455 previously allotted.

Five new UHF bands have been granted, 288 to 286, 576 to 588, 2300 to 2450, 5650 to 5850, and 21000 to 22000 megacycles, besides all frequencies above 20,000 megacycles. Two bands previously allotted, 2500 to 2700 and 5250 to 5550 megacycles, have been cancelled. A0, A1, A2, A3, FM and pulse transmissions can be used on these new UHF bands.

The types of transmission are as follows: A0 means an unmodulated carrier, A1 means CW telegraphy, A2 is modulated CW, A3 is amplitude modulated telephony, A4 is facsimile, A5 is television, FM frequency modulation.

* * *

IONOSPHERIC DATA

THE Federal Executive of the WIA announced recently the formation of a special sub-committee covering ionospheric predictions.

The "Federal Ionospheric and Tropospheric sub-committee" comprises Oliver Moriarty, Doug Anderson, VK3ZV, and Neil Smith, VK3YV.

The committee will be responsible for the dissemination of data and the formulation of charts from information supplied by Dr. A. L. Green, head of the Ionospheric Prediction Service in Australia.

The chart, together with explanatory notes, will be published monthly in WIA's Radio, official organ of the June first chart will be published in adjustments. Additional data and advice via F. broadcasts, sent to all States, will be supplied weekly over the above radio channels.

The above radio channels in all States and countries are covering all States to Australian amateur prove invaluable inaugurated by the WIA—another service

EUROPEAN BAND SUBDIVISION

THE Radio Society of Great Britain has forwarded to all European National Societies of the IARU, a proposal for the subdivision of the main five bands from 3.5 to 28 mc. into telephony and CW sections. It is requested in their reply that the societies give an indication whether said subdivisions could be incorporated as part of their licence.

The RSGB considers this would be the only method that would be successful—that the divisions be enforced by the licensing authorities—no "gentleman's agreement" for them. Reports from the UK state that the standard of signals generally arriving from the Continent is, to say the least, atrocious. If some of the U.A.'s we hear, are any indication there is reason for complaint. There is also the other side of the question. Most of the hams in occupied countries have a minimum of equipment, and if there is only one filter choke, the logical place for it is in the RX—one would at least be able to hear something.

* * *

TRAFFIC HANDLING

THE Atlantic City regulations covering international amateur traffic handling vary somewhat from the current Cairo regulations. They restrict all message handling between different countries by amateurs, except where special arrangements have been made by the nations concerned.

The text of the specific regulation reads as follows: "Transmissions must be made in plain language and must be limited to remarks of a technical nature relating to tests, and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified. It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties."

As previously, amateurs in the US may handle messages of any type on behalf of third parties, provided no compensation for handling is received. This applies only within the US and its possessions. By special arrangement with the Canadian authorities, messages for third parties of an unimportant nature can be handled. Messages from

stations in outlying areas can also be handled and passed on over the same re-transmission. Similar arrangements also exist between the US authorities and the Chilean and Peruvian Governments. Here in Australia, of course, third party traffic is absolutely forbidden. The only traffic handled is by WIA stations, and covers WIA internal business matters.

Australian amateurs have often been embarrassed by American stations endeavoring to pass third party traffic to them. It was hard to explain the position over here. However, from January 1949 it will be an offence for WIA stations to pass traffic to other stations (with the above exceptions), so the VK's should not be embarrassed on that score from then on.

* * *

W.I.A. NEWS

THE NSW Divisional Council for 1948-49 was announced at the annual meeting after the declaration of the ballot by the chairman. The new council comprises the following amateurs, Messrs J. Corbin VK2YU, J. Hutchison VK2YV, N. Macnaughton VK2ZV, A. Meyers VK2VN, J. Moyle VK2JU, A. Thurston VK2AV, and H. F. Trehanre VK2BM.

The elections of councillors to special duties will take place at the initial council meeting.

Four members of the retiring council stood for re-election, Messrs. Corbin, Hutchison, Meyers and Moyle, all were elected. All four need no introduction, they have served the Institute in various capacities and are well known to most amateurs.

Newcomers to the council include: Naughton Macnaughton VK2ZH. Better known as "Mac," he has been active since 1932, and at one time or another has been heard on all amateur bands. Builds really fine gear and takes a lot of pride in his workmanship. Possibly more interested in CW than telephony. He comes on with the latter on odd occasions. Married, one child and one radio widow. Prewar was active in the RAAF wireless reserve, and saw six years' service in the RAAF and as signals officer served in overseas theatres. Now in the radio trade, dispenses equipment and advice to the ham fraternity.

Fred Trehanre VK2BM, a newcomer to amateur ranks, has had long association with amateur affairs, a father or

SOME POINTS ABOUT Q.S.L. CARDS

WITH so many DX certificates available these days from various international societies, we must give some thought to the data we supply on our QSL's.

To qualify for these awards it is usual to forward cards as verifications of contacts made. The societies granting DX awards require certain information to be clearly displayed on the card. The amount of information depends on which society is issuing the award—the RSGB, for instance, requiring signal reports to be shown.

Fifteen years ago it was the fashion to cram as much as possible on QSL's, some of it often superfluous. These days, information is generally cut to a minimum, and often the amount supplied falls short of requirements as laid down by the various societies for their awards.

Essential information that should be shown on all cards is as follows:—

A common habit is to use the following wording on cards: "To Radio XZUR UR sigs HR RST 579." no mention being made of an actual QSO. When the committee examines such a card they

cannot say whether the card covers only a report or is intended as verification of a contact, and as above are invariably rejected, unless the sender has happened to write "Tx for the QSO" on the card. The correct procedure would be to commence, "To Radio XZUR in confirmation of our contact," or some such phrase.

The second point is to clearly show whether the contact is made with telephony or CW. The station you work might want to use your card towards a telephony award.

The third is on the subject of signal reports. As the RSGB requires a minimum signal report of R3 and S3 before the contact can be counted, a signal report on all cards is a "must."

The final point, and one often missed, is showing the date of the QSO. Awards these days are divided into all time and postwar certificates. So to show a date is essential for a credit towards an award. If you want your cards to be useful for others for DXCC, Berta, WAC, etc. awards be sure to clearly show all the above information on your QSL.

C. C.

hams, Ross VK2IQ and Elgar now
ing a G call. We often hear of
s following in father's footsteps, but
't often see the procedure in reverse
his ham game must really have
ed the Director of Music in the
ation Department for many years,
in recent years resigned, but is again
k in the teaching profession.
rthur Thurston, VK2AV is an active
inner, but in recent months has been
y from the home QTH, and so not
in heard. Works quite a lot of tele-
my and active on 40 in various nets.
home sports a rotary 10-metre beam-
ides the conventional Zepp. An in-
trial chemist by profession. We
ertain the above three hams will
valuable workers for the WIA and
NSW amateurs.

other business transacted at the an-
l meeting included the ratification of
amended Federal constitution.

rank Goyen, VK2UX, was appointed
itor, while John Moye, VK2JU, was
ointed Federal councillor for the
uing year.

another officer will be appointed to
ordinate and supply information from
vice equipment manuals. A great
mber of members have presented an-
er to supply information from a wide
ety of manuals.

arrangements are to be made for
publishing of an azimuthal map cen-
d on Sydney.

U.H.F. NEWS

HE annual election of officers for the
NSW Division of the UHF section re-
lts as follows: The two principal
icers, president and secretary, were
elected. Chas. Fryar, VK2NP, is to
upy the chair; Maurice Findlay, VK2PW,
mains secretary. Bill MacGowan,
e-president, and Fred Carruthers,
e-PP, publicity officer, were also elect-
ed. The election was held at the May
eeting where a lecture was presented
Mr. Sheridan, of the CSIR, the
bjeet, "Multi-Track Radar."

AMERICAN TELEPHONY

HE current poll being run by the ARRL
on allocations has resulted in quite a
t of pertinent comment on Telephony
e-divisions.
Pre-war polls had clearly shown that
union was in favor of allocating section
e 7mc. for telephony, providing that
e broadcast stations operating between
00-7300 kcs caused interference to CW
orking and W station are questioning
e reasons for another poll on this
atter. In 1941 another effort was made
open 50kc. of 7mc. for telephony but
e war intervened.
The final decision rests with the ARRL
oard of Directors and will be guided to
me degree by the results of the poll.
The main worry, according to QST
respondents, is the 14mc. telephony
mits and its extension to high frequency
mits of the band, forcing all foreign
ones to the 14000-14200kc. sector. Be-
des limiting the effective CW section
f the band, the US amateurs will ruin
e band, according to many US amateurs, will ruin
inc. as an international telephony band.

1948 TRANS-TASMAN CONTEST

MANY of the old Fisk Trophy enthu-
siasts were active in this contest. The
W section seemed to be better supported
than the telephony. 2DI, 2QL and 2RA
ere in NSW should have good scores.
QL getting a multiplier of 16—all four
New Zealand districts on 10, 20, 40 and 80
netres.

2CI should be close to the NSW winner
in the telephony section with about 500
oints.

The contest clashed with a NZ effort
nd there was some confusion on the
exchange of serial numbers.

GET YOUR TICKET!

And join the ranks of licensed amateur
transmitters. The W.I.A. holds regular
classes in theory, practical work, and
code. Fully qualified instructors.

Write for particulars to the Ama-
teur's official organisation,
THE WIRELESS INSTITUTE OF
AUSTRALIA.

Class Manager, Box 1734, GPO, Sydney.


PERSONALITIES

ALEC MARSHALL, VK2HM, one of Aus-
tralia's best-known old-timers, passed
on during May. Alec had recently made
a comeback on 20mx CW. Operating for
many years from Armidale he was very
well-known on the old 32-metre band
WICH after 18 years still remembers
AO2HM's signal arriving the long way
round.

Two rather scarce Oceania stations were
active during the month. FK8AB, 14175
and 14650, and FU8AA, 14000. As usual,
there was an awful row on their frequen-
cies—a large reward for a solution to
VFO attacks.

We hear a lot these days of so and so

receiving a card from G9XYZ claiming a
contact—so and so was not on at that
specific time so the often uncritical con-
clusion is that a pirate is using the call.
If it is a claim for a telephony contact,
it's practically a certainty that there has
been a phonetic error in the call. The
same applies to a CW contact to a lesser
degree, when conditions are bad. Quite
often some one comes back with a mis-
taken call (it may be the morse). There
is another aspect of the matter, do you
check the call signs on cards as you write
them—do so, you will be surprised at the
mistakes, besides the problem of illegible
writing.



THE STORY OF HENRY JONES

Young Henry was wiser than they thought. He was
wise to his future and in his spare time became a

REFRIGERATION SERVICE EXPERT

ELECTRICITY • GAS • KEROSENE



GOSH! THE REFRIGERATOR WAS BROKEN DOWN, ALL THAT WEEK END FOOD TOO—WHAT ON EARTH SHALL WE—

WHAT, THAT YOUNG HENRY JONES!

DIDN'T YOU KNOW? HE'S A QUALIFIED REFRIGERATION SERVICE EXPERT NOW!

I'LL RING HENRY JONES, AT HIS HOME.

HE LEARNED BY MAIL AND MAKES LOTS OF MONEY IN HIS SPARE TIME ALREADY.

EVERYTHING'S O.K. NOW MRS BROWN

OH! THAT'S WONDERFUL

WELL I NEVER, GIVE HIM A RING RIGHT NOW—



The story of "Henry Jones" may be your story, and his future of independent prosperity may well be yours, too. Modern Refrigeration Service, Electricity, Gas, Kerosene, opens up a wonderful field for young men of average education who wish to make good money in an overcrowded occupation...

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STEADY EMPLOYMENT—CONGENIAL WORK
THE DIESEL ENGINEERING COLLEGE

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Please send me immediately full particulars and Syllabus, free of obligation, of your modern REFRIGERATION SERVICE COURSE.

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Age _____

R _____

GOOD MONEY • INDEPENDENCE • TRAVEL

OFF THE RECORD — NEWS & REVIEWS

This month brings some sharp contrasts in music—a Beethoven Sonata, a Dvorak symphony, and some orchestral works famous for their display of musical color. Good vocal work is also included.

BENNO MOISEWITSCH, Pianist, "Sonata No. 21 in C Major" and "Rondo in C Major," Op. 51, No. 1 (Beethoven). HMV EB 438/40.

Not all works, not even those of Beethoven, can be termed magnificent, this being the most appropriate of adjectives. The Waldstein Sonata is one of these, a work not played too much, but not often well enough.

It is in truth a magnificent sonata, a glowing fire in itself, a thing of flames and embers, out of whose heart radiates urgency and power, a landmark in musical thought, and an indication of things to come.

The piano sonatas of Beethoven achieve a musical force unequalled elsewhere, not even in the symphonies. He was probably the first composer in whose music thought became more important than form, technique and material. In his later sonatas, of which Opus 111 is possibly the finest example, one is elevated completely above the musical medium, inevitably conscious of a close contact with another mind, a contact more inti-

mate than can be achieved with words or pictures, so demanding in its impact as to make impossible more than a brief experience.

It is this ability of Beethoven to so master his craft as to find expression of himself, and to reflect the broad compass of his thought and experience, that makes his "third period" one of the inexhaustible caverns in all music.

In the Waldstein, we can see all this beginning to stir. No one can hear it without being instantly impressed by the fact that he is receiving more than a mere tune, more than notes on paper turned into sound. To the receptive mind, there is instant recognition that he is receiving an intelligence, the "emergent quality" that defies time, death, and almost beyond grasp or definition. It is unmistakable and inevitable.

If your reaction to a work such as the Waldstein is similar to mine, you will

agree that only one completely aware of all these things can play it, one responsive to the thought, and who automatically discards affectations and technical preoccupations which serve only to distract and belittle.

I have, therefore, been playing through several Waldstein recordings which I have in order to get an objective view of Moiseiwitsch's performance. It is one which most will find easy to hear. Actually this sonata has too much of earnest statement to charm, bemuse, or stimulate. It is, I fear, serious business—experience rather than performance.

If these records do not reach right down into the music, it is mainly because so rarely do we ever hear it played that way. I don't believe you can promise with this music, but Moiseiwitsch, alas, I fear, compromised quite a bit.

However, it may not be great Beethoven, but it is surprisingly good Beethoven. I agree with several critics who comment on a maturity rarely previously heard in this man's playing. Personally, I think he is doing better now than ever before. On all counts this is probably the best recorded Waldstein available. You may pardon me if I seem to take it too seriously, but I am old-fashioned enough to feel that Beethoven is not a man to be handled except by those great enough to understand what it is all about. I am too hard on Moiseiwitsch perhaps, but you will find the reason there. If records are far too good to be dismissed or under-rated.

PHILADELPHIA ORCHESTRA (conducted by Eugene Ormandy)—"Symphony No. 5 in E Minor" (Dvorak), Op. 9. COLUMBIA LOX. 659/62.

The New World is undoubtedly one of the most popular of all symphonies for fairly obvious reasons. It is full of fine melodies, catchy phrases, and is most engagingly orchestrated. Its sharply contrasting passages of full orchestra and woodwind, which are to be found throughout, and its inevitable progress to satisfying serenity, leave one with the impression of having made a pleasant and mildly exciting journey, as a spectator watches the passing scene.

The star movement is, of course, the second, which one is tempted to anticipate with a certain amount of diffidence due to hearing its mutilated corpse tortured so often by popular singers and jazz bands.

But it proves so lovely in its original form as to wipe completely away all such unhealthy associations. This recording is a typical American production—extreme forward, with a pronounced "studio" atmosphere quite unlike that of a concert hall. As a result, we hear things so clearly as to almost shy away from an embarrassing proximity.

It is, of course, quite on the cards that you like this close-up view of your music. I can promise you that if so, you'll miss scarcely a note in the whole show, and you'll hear some really entrancing playing, particularly from the woodwind and strings in quiet mood. My only real criticism is that I found myself in the third row from the front instead of well back in the hall. But despite it all, I thoroughly enjoyed the performance, which has all the earmarks of the Philadelphia and of Ormandy.

SAN FRANCISCO SYMPHONY ORCHESTRA conducted by Pierre Monteux (Maxim Schapiro—Piano), "Symphony on a French Mountain Air" (D'Indy), for orchestra and piano, Op. 25. HMV. ED 650/52.

A rather welcome addition to the recording library, being an attractively written work of most interesting color and unequal merit. I do not recall hearing it on records before, and if it does exist, I doubt whether the recording will compare with this one.

The main theme is announced at the commencement of the work, and after many pages of free and varied handling

By JOHN MOYLE

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The **GRAMOPHONE COMPANY LTD.** (Inc. in England),
HOMERUSH, N.S.W.

pears in the woodwind to link up at times a most brilliant play of astral resources.

fortunately I did not receive the movement, but the first and third are some most brilliant recording, with clear and wholly adequate ng. think you'll enjoy this. It has all ingredients of an easy-to-hear and sing showpiece which one can well round off many an orchestral ramme.

NCINNATI SYMPHONY ORCHES-
—conducted by Eugene Goossens, "Der
nkavalier Suite" (R. Strauss). HMV.
653/5.

te can well imagine how Strauss was
considered as being the ultimate
iclan—the man who had everything.
is Richard, of course, among the
ral Strausses.

ral music, assembled from the well-
own opera, is truly a musical riot of
hm and color, piled on with such
lance that we are almost exhausted
re the procession of marvelous musi-
things. There is, as so many will-
ily agree, no one quite like Strauss,
any music quite like Rosenkavalier.
having said this, one has pretty
ou may find them pretty severe in
playing, as neither the players nor
engineers have shown much mercy,
what there is of it has all the swing
nerve one could desire.

YMPHONY ORCH. OF THE AUGUS-
—ROME, conducted by Victor de
ata—"The Fountains of Rome" (R.
sphigi). HMV. ED 67/8.

he "Fountains" follow on the "Pines"
recently released as Respighi's most
ular works. Personally, I do not find
re highly significant in my scheme
things, although I am fully conscious
the amazingly effective tone-color
level—a tone color that is more than
re programme music trickery. There
the very essences of light and shade,
t of subtle, almost subconscious atmos-
re that tell of uncanny musical sen-
sivity.

think the "Fountains" much more
ective than the "Pines." I find no

difficulty at all in seeing the various
and varied settings afford a procession
of wind and spray of fountains that play,
that suddenly spring into life, and fade
away in a shower of color. It is, I think,
the vividness of the surrounding atmos-
phere which makes these sketches so
good; they are easy to assimilate without
being obvious.

Both orchestra and conductor have
done a wonderful job. Unfortunately, I
haven't my older Philadelphia records
at hand, but brilliant as they are, they
have great competition here. Note par-
ticularly the Triton fountains at Morn,
where so obviously the streams leap into
the air as they begin to play. Victor
Sabata is no novice at this kind of thing.
And you'll get a real thrill from the
sheer delight of hearing the orchestra
so competently at work in the creation
of this bright sound that lives in the
rainbow and the fountains of Rome.

HANS HOTTER, Baritone (Piano acc. by
Mermann von Nordberg)—"Der Wan-
derer," Op. 4, No. 1, and "Die Doppel-
gänger" (Schubert). COLUMBIA LOX.
677.

A splendid voice with a real feeling
for these two—among Schubert's most
remarkable and finest songs. They are
good.

EZIO PINZA, Bass—"Simon Boccanegra
—L'acerato Spirito" and "Don Gio-
vanni" (a), "Serenade" (with Metropoli-
tan Opera Orchestra), and (b) "Champ-
agne Aria" (with piano) (Mozart).
COLUMBIA LOX. 678.

All Pinza's records are a delight. The
Serenade and Champagne aria, however,
are an extreme contrast—the first being
an extremely vivid recording with orches-
tra, which makes the aria, with its piano,
sound extremely dull. Apart from this,
you'll enjoy the work of a fine voice and
a fine artist.

Other releases include:

COLUMBIA
SYDNEY MACBETH WITH ORCHES-
TRA—"Ho Ro My Nut Brown Maiden" and
"Jeanie with the Light Brown Hair."
DO.3147.

VICTOR SILVESTER'S BALLROOM
ORCHESTRA—"Garden in the Rain" and
"Paradise." DO.3145.

PETER YORKE AND HIS CONCERT
ORCH—"The Time, The Place and The
Girl" (Pts. 1 and 2). DO.3146.

LOU PREAGER AND HIS ORCH—"An
Apple Blossom Wedding" and "My Best
to You." DO.3150.

FRANK SINATRA WITH ORCH—"The
Stars Will Remember" (So Will I) and
"None but the Lonely Heart." DO.3151.

ROYAL OPERA HOUSE ORCH.
COVENT GARDEN (conducted by Con-
stant Lambert)—"Coppelia"—Ballet Music.
DOX.938/9.

HARRY DAVIDSON AND HIS ORCH—"Old-
Time Dance Series—"The Arcadians,"
Lancers (3 parts) and "St. Bernard Waltz."
—Thrills. DOX.940/1.

LONDON SYMPHONY ORCH. (con-
ducted by Eric Coates)—"Television
March" and "London Calling March."
DO.3132.

VICTOR SILVESTER AND HIS
BALLROOM ORCH—"Rose in the Bud" and
"(There is) No Greater Love." DO.3152.

HARRY JAMES AND HIS ORCH—"Easy"
and "Lover, Come Back to Me." DO.3153.

VICTOR SILVESTER'S STRINGS FOR
DANCING—"You Are Dancin' on the
Strings of My Heart" and "Pink Carna-
tions for My Lady." DO.3154.

BENNY GOODMAN SEXTET—"I Got
Rhythm"—Benny Goodman (Clt.); Slam
Stewart (Bs.); Mel Powell (Pno.); Mike
Bryan (Gtr.); Morey Feld (Dms.); Red
Norvo (Vibraphone), and "Just One of
Those Things"—Benny Goodman (Clt.);
Slam Stewart (Bs.); Teddy Wilson (Pno.);
Mike Bryan (Gtr.); Morey Feld (Dms.);
Red Norvo (Vibraphone). DO.3155.

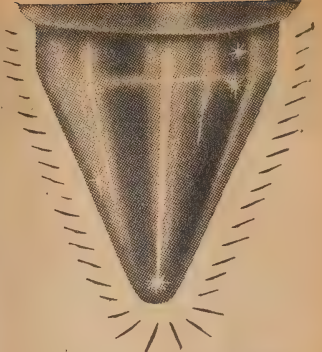
HMV
VAUGHN MONROE AND HIS ORCHES-
TRA—"When the Angels is Ringing" and
"Moon Over Miami." EA.3688.

ARTIE SHAW AND HIS ORCHESTRA
—"Love is Here to Stay" and "September
Song." EA.3689.

SPIKE JONES AND HIS OTHER OR-
CHESTRA—"Minka" and "Lassus Trom-
bone." EA.3690.

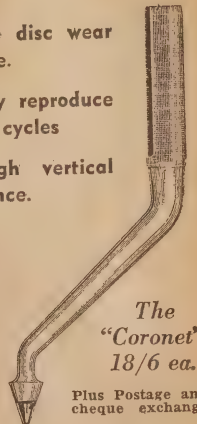
LARRY GREEN AND HIS ORCH—"Sipping
Cider by the Zuzyer Zee" and
"When You Let Me." EA.3691.

THE THREE SONS—"Never Knew"
(I Could Love Anybody Like I'm Loving
You) and "Sentimental Souvenirs."
EA.3696.



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LETTERS TO CORRESPONDENTS

B.A. (Ivanhoe, Vic.) is interested in broadcast band DX and would like to see the broadcast band notes reappear. He also mentions a list of verification cards he has received from various Australian stations.

A.: Many thanks for your letter which was read with interest. It is always very gratifying for us to receive letters from our readers and to hear that our magazine is a means of assisting them in their hobby. We were very reluctant to omit the broadcast band notes but had to do so because of the shortage of space. Glad to hear that the "Little General" came up to your expectations.

J.D. (Harbord, NSW) writes in lighter mood about an amplifier he recently made from junk parts and which is doing a fine job.

A.: Many thanks, J.D., for your interesting and amusing letter. It is certainly surprising what can be done with a little ingenuity and a few old parts. The A442 tetraode probably has a short between the plate and the grid. We are also very pleased to note your remarks about the new price of "Radio and Hobbies".

J.H. (Singapore, Malaya) writes to thank us for information received through the query service. He has completed the all-battery "Little Jim II." to which he added an audio stage and the set is now able to operate a loudspeaker.

He would like to see a code practice oscillator described in Radio and Hobbies.

A.: Many thanks for your letter and we are very glad to hear of the pleasing results with "Little Jim II." An AC-operated audio oscillator suitable for Morse practice was described in the April, 1942, issue. The original issue is now out of print but copies of the circuit are available through the shilling query service.

F.B. (Turramurra, NSW) sends in some suggestions for Radio and Hobbies in response to our recent editorial. He also encloses an amplifier circuit for comment.

A.: Many thanks for your letter which was read with interest. We agree that there is a need for articles of an elementary nature and have been attempting to fill that need by publishing the Junior Experimenter articles. However, you can rest assured that we will keep in mind the points which you have raised when we are considering further articles. Your amplifier circuit is in order and should perform very well.

J.F. (Muresk, Sth. Aust.) forwards a remittance for subscription. Also says that the "IK5-One" which he built up works very well. He expresses enthusiasm for the magazine and says that he finds lots of useful hints in it.

A.: Your subscription remittance, J.F., has been dealt with by the appropriate department. We are very pleased to note your enthusiasm for the magazine and we trust that you will continue to

find such interest in all future issues. W.S.L. (Woodville Park, SA) says he is building the "Minivox" receiver and is keen to fit it into a plastic cabinet.

A.: To the best of our knowledge there is no plastic cabinet available suitable for this receiver, nor is there likely to be one. The production of a plastic cabinet normally requires the preparation of expensive dies which, in turn, demands a guaranteed market of many hundreds or thousands of cabinets to offset the cost. This is probably the chief reason why plastic cabinets of distinctive styles have not been available to any extent for home constructors. In compiling parts lists errors occasionally creep in, despite cross checking. Generally speaking, the schematic circuit is the final authority on what should or should not be included.

THE following reprints are available

on application at our office, 60-70 Elizabeth-street, Sydney. They will be sent, post free, on receipt of stamps or postal notes.

How to build a Synchronous Clock.

4 Pages 1/-

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8 Pages 1/-

Build Your Own Windcharger.

8 Pages 1/-

Coil Details for Small Receivers.

1 Page 6d.

Radio Circuit Symbols.

1 Page 6d.

Collecting Verification Cards.

1 Page 6d.

K.K. (Mile End, SA) expresses his appreciation of "Vox Major" and "Vox Minor" and also renews his subscription to Radio and Hobbies.

A.: We are very glad to note that the amplifiers are performing to your satisfaction and also that you caught up with the subscription renewal before too late. The way things are at the moment there are very few extra copies left over each month and these are soon cleaned out by the persistent demand for back numbers.

W.D.V. (Belair, Sth. Aust.) in forwarding a remittance for extra subscription suggests that articles on transmitting and receiving aerials would be useful to readers.

A.: Thanks, W.D.V., for the remittance. Articles on antenna systems both for transmitting and receiving are envisaged for inclusion in the not too distant future.

J.S. (Geelong West, Vic.) renews his subscription and asks a question con-

cerning record wear with certain types of needles.

A.: Your subscription is being duly taken care of by the subscription department, J.S. It is not really possible to make any clear recommendations concerning record wear with various types of needles, since the choice of needle is governed by many secondary factors. Sapphire-tipped needles are widely used in the modern lightweight pick-ups and provided that they are accurately ground they give good fidelity with low wear on both needle and disc. However, they are liable to fracture if used with a heavy pick-up or worn discs and should be carefully inspected from time to time to ensure that they are not causing damage to records as a result. The risk of fracture is reduced in needles with a bent shank, although this scheme of the high note response to a certain extent. Thorn type of needles give a record wear and often play from the six sides without sharpening. It exhibits serious high note loss. Some enthusiasts are quite prepared to put up with the resulting "mellow" tone although the loss can be restored to some extent by treble compensation in the amplifier.

W.J.H. (Malvern, Vic.) would like to see some practical articles in Radio and Hobbies on grounded grid amplifiers and V.H.F.

A.: Many thanks for your letter and suggestion. Actually we have had to put it in mind for some time but the pressure of other work has prevented us from doing many experiments along these lines. However, you can rest assured that, as soon as time and space permit we will look into the matter.

G. St. C. (Gordon, NSW) forwards his remittance for an annual subscription and asks a question regarding the supply of cabinets for sets described in R. and H.

A.: We thank you for your subscription which has been taken care of by the subscription department. When designing small receivers like the "Little General" and "Minivox" we generally take up the matter of the cabinet with the manufacturers and, if a new design is called for, the basic dimensions and layout are communicated to them by means of a blueprint. With the larger mantel or console receivers the exact dimensions and dial arrangement is not so critical and we prefer to leave the choice to individual constructors. Most radio houses handle mantel and console cabinets and will advise about dimensions, price, availability and type of dial be suitable. Big radiograms are quite expensive and the best of them will not leave much change out of £20.

N.G. (Marrickville, NSW) says he has constructed the "1941 Super Six" and obtains excellent results from it. He is interested in the noise limiting circuit mentioned in the February issue.

A.: We are very glad to note that your "Super Six" is performing so well and will keep your other suggestions in mind so far as the noise limiter is concerned. It should be very useful in suppressing loud crashes of static when listening to distant stations. It could be installed on most superhet circuits provided there is room to accommodate the extra valves necessary. The 6HG replaces the existing diode circuit and will supply any necessary AVC voltage if this is not already obtained from a diode separately fed. noise limiter will handle noise voltages in excess of 100 per cent of the signal modulation but are quite useless against low level background hash as commonly encountered in built-up areas.

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Prompt cash paid for used stamps. If you wish I will send cameras, clothing, fountain pens or other merchandise in exchange. Send 300 or more stamps. High values are worth the most, and please do not send Australia stamps except above 2½d values, although all stamps are wanted from the British and French Islands of the Pacific. J. JOHNSON, 727 North Foote Ave., Colorado Springs, Colo., U.S. of America.

HOW TO SUBMIT YOUR QUERY

1. Queries will be answered in rotation through the columns of our magazine if not accompanied by a fee for a postal reply.
2. Queries, neatly and concisely set out, will be answered by mail as quickly as possible if accompanied by 1/- in postal notes or postage stamps, Endorse envelope "Query."
3. Back numbers are rarely available but reprints of most circuits, wiring diagrams, and parts lists will be supplied for 6d each, minimum charge 1/-. Thus a circuit, layout, and parts list will cost 1/6 in stamps or a postal note. Endorse envelope "Circuit."
4. Blueprints of exact size chassis layouts with all essential holes and cut-outs will be supplied if available for 2/6. Endorse envelope "Blueprint."

Address your letters to the Technical Editor, "Radio & Hobbies," Box 2728C, GPO, Sydney.

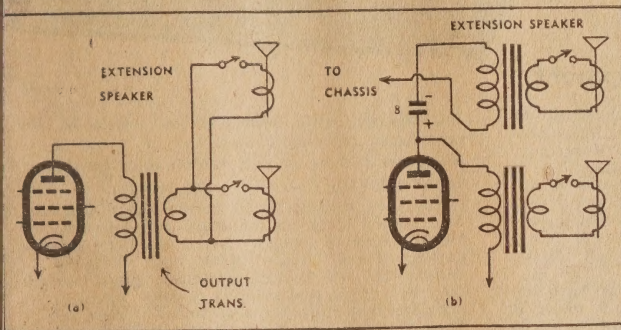
FITTING EXTENSION SPEAKERS

I have a five valve dual-wave receiver which operates very well on both bands. I would like to operate a second speaker in another room, and to know how the extra speaker has to be connected.

In the first place, any old speaker will not do. Heirlooms of the past in the way of old horn and cone speakers are generally so bad that the average listener is not likely to tolerate their tonal qualities—or lack of them. Then again, a spare electro dynamic speaker will not do since no simple provision can be made in most cases to energise the field coil.

two wires or terminals through to the voice coil leads of the extension speaker.

Use fairly heavy connecting leads, the now popular plastic flex being excellent for the purpose. A simple off-on switch may be wired to break one of the extension leads, thus rendering the extension speaker inoperative. Alternatively, a single-pole double-throw switch may be connected to make and break



So, broadly speaking, an extension loudspeaker must be of the permanent type, and preferably of not too ancient vintage. Old permagnetics were only fair in their prime and subsequent weakening of the magnet, sagging of the cone and fouling of the air gap is likely to have reduced their efficiency still more.

So try to obtain for the extension speaker a modern permanent unit and mount it on a baffle or in a small cabinet for physical protection and also in the interests of tonal quality.

Now for the electrical connections. If the extension speaker has the same voice coil impedance as the main speaker, the two may be operated in parallel. If the figures of impedance are not known, you may be able to ascertain them from the speaker or set manufacturer by quoting the model number of the set, type numbers of the individual speakers and the external diameter of the cone housing.

Locate the output transformer on the main speaker and the two leads which run to the coil at the apex of the cone. Run your extension leads from these

the voice coil connection to either speaker in the alternative positions. Or again, individual switches can be added to allow the speakers to be used together or individually.

If the voice coil impedances are dissimilar, it is better to fit the extension speaker with a transformer reflecting the same load impedance as the transformer on the main speaker. It can then be connected in series with an 8mfd electrolytic condenser between the plate of the output valve and chassis. Switches can be arranged to break the voice coil connections at either speaker, leaving the original output transformer in circuit at all times.

With a push-pull output system, the extension speaker can be wired across the two plates, with an 8mfd condenser in series with each lead.

All these schemes inevitably reduce the load on the output valve but work satisfactorily in practice. Since the speakers share the available power output, it is usual for the addition or removal of either speaker from circuit to affect the volume in the other.

L.E.R. (Geelong West, Vic.) had difficulty in obtaining a copy of the Shortwave Handbook. He enclosed 2/- in the hope that we still have copies available.

A. A copy of the handbook has been forwarded on and should have reached you before you read this. We are at a loss to explain why you could not obtain it through the usual channels.

H.C. (Soerabaya) renews his subscription to "Radio & Hobbies" and expresses his appreciation of the articles.

A. Many thanks for your subscription renewal and also for your appreciative remarks. Apparently there was some misunderstanding about the October issues and we have checked our subscription list to avoid further difficulty of this nature. We note your comments about availability of components.

K.B. (Launceston, Tas.) sends in a request for a Shortwave Handbook and adds a couple of questions to the letter.

A. We have forwarded on to you one of our few remaining copies of the Handbook, K.B. The required speed in the sending and receiving of Morse Code in connection with the examination for the AOPC is 12 words per minute. Speakers of the size mentioned in your letter are capable of handling comfortably audio power in the vicinity of eight watts only. One speaker only would be incapable of doing justice to the full output of the "807 Radiogram." It is not to be expected that the volume control of any set or amplifier may be advanced to the "full-on" position without distortion becoming apparent either through overload of the speaker or output stage.

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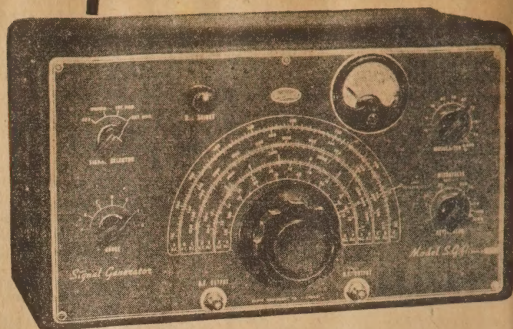
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The internal construction is such that adequate comprehensive shielding is provided. A meter is fitted which indicates the grid current of the oscillator and hence indicates the strength of oscillation. The radio frequency output is taken through a carefully constructed capacity piston attenuator to the control grid of the modulated R.F. amplifier, which is operated as a cathode follower. A Hartley type 400 cycle A.F. Oscillator with harmonic filter provides internal modulation at any desired percentage up to 100 per cent. by means of grid modulation of the R.F. amplifier. Also the 400 cycle signal is available at an A.F. output socket—

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| Band "C"—550 ... 1500 K.C. | Band "D"—1250 ... 3600 K.C. |
| Band "E"—3.5 ... 10.6 M.C. | Band "F"—10 ... 30 M.C. |
| Band "G"—35 ... 110 M.C. | |

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| | |
|--------------------|--------------------|
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Accuracy of spot frequencies plus or minus 0.5 per cent.

R.F. OUTPUT VOLTAGE:

Approximately 1 microvolt to 0.1 volt. Variable by capacity piston attenuator with approximately logarithmic scale, calibrated in microvolts and millivolts. Input voltage to attenuator indicated by meter showing grid current of oscillator tube.

R.F. LEAKAGE:

Less than 1 microvolt at frequencies below 3.5 megacycles

its strength being adjustable by means of the modulation percentage control.

A special feature of this remarkable instrument is the provision for very rapid selection of commonly used frequencies by setting the tuning dial to a special mark on the scale, and selecting the "spot" frequency listed by means of a band selector switch. These "Spots" have been designed to occur with the tuning condenser plates almost fully in mesh so that stability is good. Special care is paid to the calibration adjustment of these points. Thus you can line a receiver easily and quickly and also check production receivers without complicated re-tuning of the signal generator. A flick of the switch selects the "spot frequencies," thus cutting down work time which is valuable. This instrument goes with the times, it has a very wide frequency range covering from 110 megacycles to 155 kilocycles. The accuracy of calibration is plus or minus 1 per cent. Truly an instrument to be proud of. Here are the main specifications set out below.

OUTPUT IMPEDANCE:

Approximately 200 ohms.

MODULATION:

Variable amplitude modulation from zero to 100 per cent. by means of calibrated control with 30 per cent. clearly marked, is provided from internal oscillator at 400 cycles plus or minus 5 per cent. External modulation is possible at any audio frequency.

DUMMY AERIAL:

A standard I.R.E. dummy aerial, effectively shielded, is provided.

POWER SUPPLY:

190 to 260 volts A.C. at 50 cycles per second.

VALVES:

- 1 type 6V6GT R.F. Oscillator.
- 1 type 6J7G A.F. Oscillator.
- 1 type 6U7G R.F. Cathode Follower Amplifier.
- 1 type 6X5GT Rectifier.

Case Size: 14 1/2" x 8 1/2" x 8 1/2" over controls.

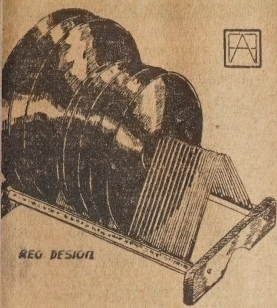
FINISH: Case—Black Brocade. Panel—Dark red enamel with raised nickel-plated markings.

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ANSWERS TO CORRESPONDENTS

M.M. (Bendigo, Vic.) writes in with a query concerning the Jeep 5-valve B/C set.

A. Your description of the "oscillation" appears to be a result of feedback through the power supply between the audio stages. This may usually be cured by introducing decoupling in the HT feed to the plate of the 6BG6. Such decoupling would take the form of a resistance of from 10,000 to 50,000 ohms connected between the bottom end of the .25 megohm plate load and the HT with the junction of the two resistances bypassed to chassis with a condenser of from .1mf. to .8 mf. Of course, as you say, this condition is not troublesome at the present time because it does not occur until the volume is turned full on. A mica bypass from the 6BG6-G or 6F6-G plate to earth may also improve matters. Bias for the converter valve is supplied via the AVC network from a tapping on the back bias resistor. We thank you for your kind remarks concerning the magazine. We trust that you will continue to find interest in the future issues.

R.D. (Hamilton, NZ) sends along a circuit illustrating his version of the "Tom Thumb." He has named his set the "Tiny Tim" and says that he has had quite satisfactory results from it.

A. Thanks, R.D., for your letter. We have glanced at your circuit and noted the trend. The introduction of the reaction wiring into the screen circuit with the detector output being taken from the plate may provide you with a little more sensitivity. Alternately, and for the same result, the 1S4 detector could be wired as a pentode with the reaction remaining in the plate circuit. In your circuit the wiring of the on/off switch is shown as being in the filament circuit of the 1S4 detector only. We presume that this is merely a circuit error as you would soon become aware of a permanent connection of the 1S4 audio filament to the A battery by the shortened life of this battery.

R.F.W. (Mentling, NSW) sends in a further amount to cover his subscription at the new rate. He mentions that he is studying for a "ham" licence but at the moment is having difficulty in getting enough time to practice the Morse. A receiver which he has completed and which gives good results. The valve line-up is an EF50 R.F. stage and an EC435 converter. The rest of the valves with the exception of the 6BE noise limiter, are battery types.

A.: Many thanks for your further subscription which has been duly noted. Your set will no doubt be of interest to readers since the big advantage is that you use the high performance AC types for the most important stages and at the same time have a fairly economical set to operate from batteries. Many thanks for your kind remarks with regard to Radio and Hobbies and we would like to take this opportunity to wish you the best of luck with your AOCF examination.

L.M. (Camperdown, NSW) writes for some copies of back dates of R. and H. and also asks that a circuit for a 4-valve vibrator receiver be published at some time.

A. We have despatched the back dated copies required. Regarding the receiver circuit, the very thing was published in the March, 1947 issue of R. and H. This set was the "Futura-F" a 4-valve vibrator-operated receiver operating from a 6-volt accumulator.

R.H.H. (Hillston, NSW) sends in his subscription renewal and accepts our invitation in the February issue to comment on our magazine.

A. Many thanks for your kind remarks in regard to "R & H". The subject of battery powered equipment is one that we agree could receive further attention and we may find time and space to do this in the future. As you are no doubt aware there is a considerable quantity of genemotors and vibrator supply units available at the moment from the various disposals dealers. Most of these units are of very good quality indeed and, since there is a limited demand for them they usually can be bought for a very small figure. The standard voltage used for aircraft radio equipment is 28 volts. Thus most of these units are suited to operate from 32 volt home lighting units, although a small dropping resistor is desirable.

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FOR SALE: SCR-AR-283 Transmitter and Receiver combination, consisting of BC-AR-230, 4 valve transmitter and coils range 2500-7700 kcs, 6 valve receiver BC-AR-229. Complete with all control boxes. Dynamotor, etc. Brand new, £12/10/-, A. MacIver, Dutton St., Hawthorne, Brisbane. Qld.

FOR SALE: 2 magnetic pick-ups, turntable, metal rectifiers, valves, B-eliminator, generators, No. 11, transmitter chassis, G12 speakers, 6", 8", 10" P.M. speakers, power transformers, one complete Radio Serviceman's Course. Write for details. Mackay's Radio Service, Harwood-road, Maclean.

FOR SALE: 1 5in. permag. speaker; 1 DA7 dial unit; 1 3-gang and 1 single gang condenser; 1 5meg. pot. with switch; 1 Morse Key; 1 loop aerial; 1lb. reel of tinned copper wire; 1 pr. 4000 ohms earphones; R. & H. August, 1946 to date. Apply Saturdays: R. Clegg, 38a Sutherland-street, Cremorne.

FOR SALE: Two valve set, J36-IL5, dial, good daylight reception, will run speaker perfect at night; complete with phones, £8/10/- 5in. speaker, £2 extra. Multimeter, home made, neatly case with shunts and terms, £2/10/-, or best offer. Write M. Pilcher, Pentland, Queensland.

FOR SALE: "Pioneer" test oscillator. RTD5, 2 x CV6, 2 x EF50, 4 x 807, 2 x 6X4, 2 x 6N7, 4 x 6K7-6 valves, 10/- each, 1 genemotor, 12v input, 275v and 500v output, £3/10/-, 0-500 micro-amp meter, 15/-, 2 x 8K Rola Speakers, £15/- each. R. L. Crick, Beaufort, Victoria.

FOR SALE: Supersteter, £27; USO Universal Speaker, £10; SOA Oscillator, £7; Junction Box, £1. All in excellent condition. Also box of radio parts, valves, speakers, transformers, etc. C. Ankin, 23 Findlay Avenue, Roseville.

SALE: Signal Gen., 100kc/s to 32mc/s IUV to IV, 400 cps. mod. Res. att. attenuator. Output metered. Standard dummy aerial. Regulated high tension, £15. J. Sproule, 1 McIntosh Street, Gordon.

FOR SALE: Crystal microphone inserts for microphone described May issue. Radio and Hobbies; brand new, in original boxes. Few available, 25/- each. Brown, 27 Badgery-avenue, Homebush, N.S.W.

FOR SALE: Fireside five D.W. A.C. mantle radio. Polished red cedar, solid cabinet. Perfect order and tone, price £25. Norman Hart, Sunny Corner Street, Bellingen, N.S.W.

FOR SALE: Famous "Ultimate" 7 valve band-spread dual-wave table-model receiver in excellent condition. Price £27/10/-. John Naylor, 24 View-st., Mont Albert, Victoria.

FOR SALE: Palee valve and circuit tester, A/C, £19, or will exchange for A/C-D/C ramp. motor, etc. H. Brooks, 191 Dugan-street, Kalgoolie, W.A.

FOR SALE: Little Jim's Mate in excel. cab. with batteries, less phones, £3/10/-. S. W. Hill, 35A Richard-street, Coburg, Victoria.

FOR SALE: Amplifier, 7 watt portable ribbon microphone. K-10 Speaker. Suitable dance band, etc. Ring WA3673, Melbourne.

FOR SALE: 1-2 Gang Condenser, "H" type, 1 D.W. (36) Coil Bracket RCS. Both as new. What offers? "Jack," c/o P.O., Dundee, N.S.W.

FOR SALE: Multimeter, val. £12, sell £8/10/-. Also 6v. Essex Gen., £2/10/-. R. Russell, Alma 614.

SELL: Receiver Phillips, No. 4, 1, 2 to 20 megs, good order, 240v. AC supply built £27/10/-. Radio Service Manual Chitrad, £1. Bowman type model steam loco, with tender, "O" gauge, good order. Best offer. N. Arnold, Box 54, Albury.

SELL: Wireless mast, steel frame bolted construction, about 50 feet high. Telephone re inspection XM4743, Thompson, 34 Maudslong Rd., Mosman.

SELL: (1) Rola 6in. speaker, fitted with 25,000 ohm transformer, (1) 2-gang Loumer tuning condenser, (1) 1K5-G valves, (1) USL 44 dual wave tuning dial, (1) reaction cond., 0.001, (1) Reinartz coil type KC-9, £7/10/- M. Guley, Box 5, Beulah, Victoria.

SALE: 6v. DC, 240v. AC Receiver. Modified Steanes sound system set, ex disposals. Attractive black crackle metal cabinet. New condition, 3 Jones Street, Croydon, N.S.W. UA6274.

SALE: Breville five-valve RF stage dual-wave vibrator set, battery spare IL5. Set hardly used, best offer or exchange A.C. set, 31 Prospect St., Carlton, N.S.W. LW3339.

SALE: Complete kit for 6 valve superhet, plus 6in. P.M. speaker power trans. Midgate two gang condenser. Advance chassis, £20, or offer. Coote, 135 Good Street, Granville, N.S.W.

Readers wishing to buy, sell or exchange goods are invited to insert an advertisement on this page. The cost is 1/3 per line; minimum charge 3/9. Approximately 5 words to a line. Advertisements for the next issue must reach our office by WEDNESDAY, NOON, JULY 14, 1948. Dealers' advertisements not accepted.

SELL: Army No. 11 Transceiver, complete headphones, microphone, power units, also 5-inch oscilloscope, £10 each, or near offer. Must sell. G. Kinnell, 1 Woodville Street, Hurstville, LU2361, N.S.W.

SELL: Folding Camera, Ensign Ranger, 8 snaps 3 1/2" x 2 1/4" on 620 film—£6.3, 34 feet to infinity, 1-25, 1-50, 1-100 second, with case, £10. K. Campbell, 68 Piper St., Tamworth.

SALE: Valves, VU111 (10E/146) over a doz. never used, slightly used, 12SK7, 12SJ7, 12SE7, 12SH7, etc., offers of price or exchange with 6 volt valves. Box 8, Nadi, Fiji.

SALE: "University" Supersteter. Tests all radio parts, perf. cond. New £32, Sell £22, or offer. R. O'Toole, 1253 Canterbury Road, Punchbowl, Sundays, UL2092.

SELL: 10 cc Petrol Engine, Coil and Condenser, never used (has slight fault). Cost £9/10/-. Accept reasonable offer. R. A. Vanohr, M51268, Peacheater, Qld.

SELL: Efco USL 46 dial, 1 2-gang, 1 3-gang tuning condensers. New. Best offer. G. W. Rattenbury, 14 Forde St., Yass.

SALE: Amplion 5in. speaker with transformer. Set Peanut valves, midget 2-gang condenser, all new, £4. Ring XB5381 or LM4147.

SELL: Ribbon mike (new); wanted, 6v. genemotor, 10in-12in. P.M. spkr., O.P. 1. Radio, 26F Maddison St., Redfern.

SELL: MRCI Midget Communication Receiver, 150kc-20mc. Complete with coils, phones, 4 1T4, 1 1R5, £7/10/-. Harrison, Flinders Pde., Sandgate, Qld.

SELL: Genemotor 12v. in 480v. 40 ma out filtered. Excellent condition, £2. J. Benyon, 70 Ben Boyd Road, Neutral Bay, N.S.W.

SELL: Little Jim with battery, excellent performer, £4. G. Rhoades, 70 Raymond Rd., Neutral Bay.

SELL: R. & H. Vol. 6, No. 2, to Vol. 10, No. 2, inclusive. Best offer. A. Peterson, Charleston, S.A.

SELL: Piezo S8 crystal P.U., 70/- New Rothermel crystal P.U., £5 Neville, 182 St. Leonards Road, Ascot Vale.

SALE: Used Meccano parts, motors. Write for catalogue. Taylor, 45 Yamba Road, Como, N.S.W.

SALE: 2 valve set (19 & 1D4), complete with phones but less batteries. M. Laybutt, 3 Oxley St., Kingston, A.C.

SELL: A Mark III AC-DC transceiver condensers, Jap radio, phone-gal valves and tungars. Hogan, WM2997.

SELL: Brand new Radameta or will exchange for supersteter. Frank Sir 17 Linda Street, Forbes, N.S.W.

SELL: 3-4 valve A.C. mantel set, 60 cond., £8 or offer. Craig, XU4503.

WANTED: Feb. '46 Radio News August '45 Q.S.T. No reasonable request refused. Pashley, 34 Chapel St. Melbourne.

WANTED: BC453 190-550 kc/s receiver. Have new 813 for possible exchange. O'Sullivan, Box 92, Bundaberg, Q.

WANTED: 1 6F7 valve (new). For sale, 2525, 1 43 valves, good condition. Buckley, P.O. 5, Taralga, N.S.W.

WANTED: Manual for 101 or P.M. transceivers. Information. C. Peck, Hamilton Gate, Bourke, N.S.W.

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